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THE DISTRIBUTION OF THE TAX BURDEN OF FINANCING BART'S CONSTRUCTION AND OPERATIONS

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The BART Impact Program is a comprehensive, policy-oriented study and evaluation of the impacts of the San Francisco Bay Area's new rapid transit system (BART).

The program is being conducted by the Metropolitan Transportation Commission, a nine-county regional agency established by state law in 1970.

The program is financed by the U.S. Department of Transportation, the U.S. Department of Housing and Urban Development, and the California Department of Transportation. Management of the Federally funded portion of the program is vested in the U.S. Department of Transportation.

The BART Impact Program covers the entire range of potential rapid transit impacts, including impacts on traffic flow, travel behavior, land use and urban development, the environment, the regional economy, social institutions and life styles, and public policy. The incidence of these impacts on population groups, local areas, and economic sectors will be measured and analyzed. The benefits of BART, and their distribution, will be weighed against the negative impacts and costs of the system in an objective evaluation of the contribution that the rapid transit investment makes toward meeting the needs and objectives of this metropolitan area and all of its people.

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BART IMPACT PROGRAM

THE DISTRIBUTION OF THE TAX BURDEN OF FINANCING BART'S CONSTRUCTION AND OPERATIONS

OCTOBER 1977

TECHNICAL MEMORANDUM

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Washington, D.C.

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16. Abstracts

The 71-mile Bay Area Rapid Transit (BART) system is the first regional scale rapid transit system to open in the United States in over 50 years. This technical memorandum assesses the impacts of financing BART's $1.5 billion capital expenditures and $60 million annual operating expenditures on the tax burden of the region's residents.

This memorandum identifies the sources of BART's capital financing and assigns the burden of each revenue source geographically and to incidence sectors. It documents the same analysis for the difference between regional transit expenditures with BART and those that would occur without BART. The equity of the BART financing plans is reviewed in the context of their impact on representative household types. The differences between financing expectation and the reality are reviewed, in addition to policy implications to the financing plan.

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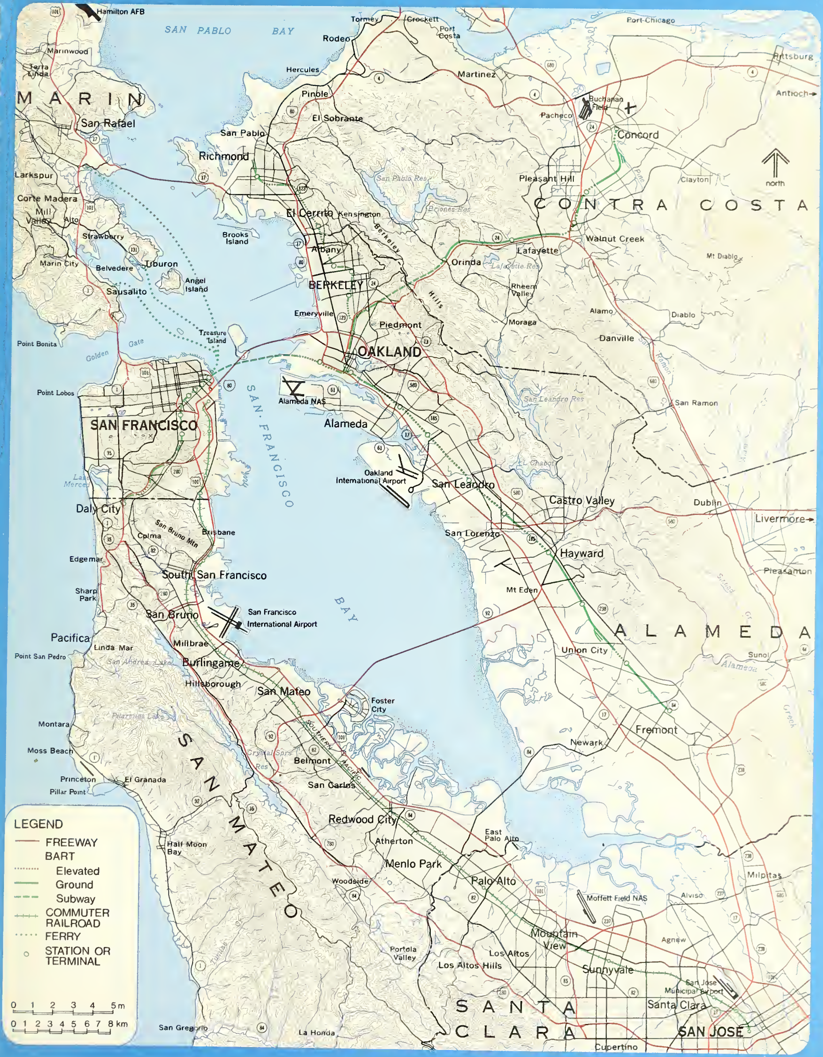

Metropolitan Transportation Commission

SAN FRANCISCO BAY REGION
CENTRAL AREA

BART: The Bay Area Rapid Transit System

Length: The 71-mile system includes 20 miles of subway, 24 miles on elevated structures and 27 miles at ground level. The subway sections are in San Francisco, Berkeley, downtown Oakland, the Berkeley Hills Tunnel and the Transbay Tube.

Stations: The 34 stations include 13 elevated, 14 subway and 7 at ground level. They are spaced at an average distance of 2.1 miles: stations in the downtowns are less than one-half mile apart while those in suburban areas are two to four miles apart. Parking lots at 23 stations have a total of 20,200 spaces. There is a fee (25 cents) at only one of the parking lots. BART and local agencies provide bus service to all stations.

Trains: Trains are from 3 to 10 cars long. Each car is 70 feet long and has 72 seats. Top speed in normal operations is 70 mph with an average speed of 36 mph including station stops. All trains stop at all stations on the route.

Automation: Trains are automatically controlled by the central computer at BART headquarters. A train operator on board each train can override automatic controls in an emergency.

Magnetically encoded tickets with values up to $20 are issued by vending machines. Automated fare gates at each station compute the appropriate fare and deduct it from the ticket value. At least one agent is present at each station to assist patrons.

Fares: Fares range from 25 cents to $1.45, depending upon trip length. Discount fares are available to the physically handicapped, children 12 and under, and persons 65 and over.

Service: BART serves the counties of Alameda, Contra Costa and San Francisco, which have a combined population of 2.4 million. The system was opened in five stages, from September, 1972, to September, 1974. The last section to open was the Transbay Tube linking Oakland and the East Bay with San Francisco and the West Bay.

Routes are identified by the terminal stations: Daly City in the West Bay, Richmond, Concord and Fremont in the East Bay. Trains operate from 6:00 a.m. to midnight on weekdays, every 12 minutes during the daytime on three routes: Concord-Daly City, Fremont-Daly City, Richmond-Fremont. This results in 6-minute train frequencies in San Francisco, downtown Oakland and the Fremont line where routes converge. In the evening, trains are dispatched every 20 minutes on only the Richmond-Fremont and Concord-Daly City routes. Service is provided on Saturdays from 9 a.m. to midnight at 15-minute intervals. Future service will include a Richmond-Daly City route and Sunday service. Trains will operate every six minutes on all routes during the peak periods of travel.

Patronage: Approximately 142,000 one-way trips are made each day. Approximately 200,000 daily one-way trips are anticipated under full service conditions.

Cost: BART construction and equipment cost $1.6 billion, financed primarily from local funds: $942 million from bonds being repaid by the property and sales taxes in three counties, $176 million from toll revenues of transbay bridges, $315 million from federal grants and $186 million from interest earnings and other sources.

March 1978

SUMMARY AND FINDINGS

The Impact of BART's Capital Financing

The cost of building BART exceeded $1.5 billion, spent primarily during a single decade (1966 through 1975). The original planning for the system envisioned a capital cost of $972 million, to be paid from $792 million of general obligation bonds and $180 million of revenue bonds from the California Toll Bridge Authority. The general obligation bonds would be retired from the proceeds of a property tax on the three counties of the BART District. The Toll Bridge Authority would retire its debt from the tolls on the Bay crossings. Additionally, rolling stock was to be purchased with $71 million raised by the sale of revenue bonds, to be retired by BART operating surpluses.

Escalating costs of construction and recognition that operating surpluses would not occur required additional sources of capital financing. The research and development aspects of BART's engineering and construction, and changing federal policies, encouraged federal contributions which provided up to $315 million. In 1969, a one-half percent sales tax increment was introduced into the three-county District, after much discussion of alternatives, to support a $150 million bond issue for rolling equipment. The remainder of the capital costs were borne by State grants or miscellaneous sources, such as real estate sales, interests, or interagency agreements.

Incidence of Financing BART's Construction and Equipment

The cumulative final incidence of BART's financing plan, over the life of the bonds (1964-1999), is illustrated in Table 1. While 65 percent of the locally funded portion of BART's costs was funded by households, either as consumers of housing or taxable retail sales, this represented less than 50 percent of the total cost of constructing BART. Practically a quarter of the total cost was paid by residents or businesses outside of the region through State or federal subsidies, another eight percent in property tax reimbursements or purchases by nonlocal residents or businesses, and almost eight percent was paid by bridge tolls.

Table 1

TOTAL BURDEN OF BART'S CAPITAL COSTS
THE INCIDENCE OF PROPERTY AND SALES TAXES
1964-1999
(in Thousands of Current Dollars)

	Property Tax	Sales Tax	Total	% of Total
Households	$ 982,989	$132,252	$1,115,241	65.0%
Businesses	379,131	36,848	415,979	24.2
Export	168,163	18,800	186,963	10.9
Unallocated	- 1,529	--	- 1,529	- 0.1
TOTAL	$1,528,754	$188,000	$1,716,754	100.0%

Source: McDonald & Grefe, Inc.

The households of the region, which paid the largest share of the local burden, did so with two regressive taxes, the property tax and the sales tax. While other financing sources reduced the absolute burden on each taxpayer, they did not change the fact that the lower-income groups were paying a greater percentage of their incomes to finance BART's construction than higher-income groups. This phenomenon, however, is true of the financing of most public projects.

The Impact of Financing BART's Operations

BART operations cost an estimated $55.8 million in fiscal year 1976. Operating revenues were received from fares, interest, property tax, sales tax, and federal and State grants. Neither these expenditures, nor these financing requirements, would have occurred in the absence of BART.

On the other hand, the Alameda/Contra Costa Transit District (AC Transit), the San Francisco Municipal Railway (MUNI) and Greyhound, the other transit operators serving BART's service district, would have increased their operating costs (and increased their patronage) in the absense of BART.

It has been estimated that the increased operating costs for AC Transit would have been less than the increased operating revenue from greater patronage, since its load factors on the profitable trans-Bay routes would increase. Moreover, because AC Transit's operating deficit is funded primarily by a property tax in Alameda and Contra Costa Counties, in the absence of BART, the District's increased revenue may have permitted a reduction in property tax rates. This would imply the BART impact in these counties has been higher taxes for both bus and rail transit than would occur without BART.

MUNI operations in the absence of BART would have required over $5 million more than the increase in operating revenue from greater patronage. Since MUNI is funded by the General Fund of the City and County of San Francisco, it has been assumed that the tax rate would not have gone up to fund this difference. Other expenditures on government programs would have been decreased, or other State and federal programs utilized, to fund this deficit. Therefore, there was no tax impact from the change in MUNI service levels. Similarly, the increased Greyhound service, although operating at a deficit, would have been funded by profits from other Greyhound service areas.

The greatest geographic burden is paid by the taxpayers of Alameda and Contra Costa Counties, where BART has increased the current tax bill for bus transit, as well as adding BART's. Furthermore, the distribution of State subsidies currently received by BART to MUNI and AC Transit, depending on their allocation, could reduce AC Transit District property tax rates an additional 19 percent.

The impact of BART's operations on the financing of regional transit, then, is more complex than BART's financing plan alone. The net BART financial impact has been increased property taxes, both for BART and AC Transit. BART's one-half percent sales tax increment in the three counties would not have been implemented to fund operating deficits of the NBA. Since federal Section 5 operating subsidies would occur in the same proportion to operating deficits, there would be no change in the level of that external subsidy to transit service. And interest earned within the region by BART's deposits would not represent a net inflow of funds.

Incidence of Financing BART Operations

A major proportion of the impact of financing the operations of regional rapid transit, not unlike its construction, falls on the District's households. The households bear nearly 40 percent of the total cost of operating BART (69 percent of the portion funded by property and sales tax), whether or not they are BART riders, and whether or not they have benefited from BART's contribution to the region. The household financing of

BART's operations was through the same regressive taxes -- property and sales -- which financed construction and equipment. As a result, households with lower incomes paid a greater percentage of their income to support BART than did households with higher incomes.

Equity Considerations of BART's Financing

The financing program for BART's construction and equipment, as well as operations, can be viewed as a two-part pricing scheme. The property and sales taxes represent a price for access to the system, essentially membership dues. Transit fares represent payment for service received.

As a charge for benefits received, BART property taxes should have been levied in proportion to the property value increases generated by the presence of BART, in line with the concepts of value capture mechanisms pursued by UMTA. A uniform property tax across all three counties clearly did not provide this distinction, violating horizontal equity.

If there had been merit in the predictions of rapid transit's influence in stimulating the region through economic development and employment, the financing plan -- with its emphasis on property values and, later, consumer purchases -- might have been appropriate, despite the absense of any relationship to transportation benefits received. But the Economics and Finance Project of the BART Impact Program was unable to identify any economic benefits accruing in the region from BART other than the impacts of the expenditures on construction, equipment and operations. Hence, the financing plan, in retrospect, was regressive in concept as well as in execution.

On the other hand, there is a hint of neutrality to this portion of the financing paid by property taxes and sales taxes: everyone pays, regardless of whether they intend to ride BART.

The second element of the financing plan involved payment for service transit fares. BART's original financing plan reflected greater use of this more equitable source by financing a portion of the capital cost, the rolling equipment, from operating surpluses. In that approach, the riders -- or those who benefit -- would have paid a greater share of the capital cost than the nonrider (and all the operating cost). This potential source of capital financing, however, did not prove reliable.

Measured against vertical equity, the ability to pay BART's local financing did not fare well. Capital financing was undertaken with two regressive taxes. The property tax, when it is passed on to renters, affects both the wealthy and lower-income groups in an essential portion of the budget, the cost of shelter. The sales tax is regressive in that it taxes purchases of lower-income groups as much as the purchases of higher-income groups, but consumption represents a larger portion of lower-income budgets.

Identifying different types of representative households, including the poor, retired, middle-income family and the affluent, this project measured the percentage of annual income likely to be spent financing BART. The tax burdens as a percent of income range from 0.15 percent for a family of six at $18,000 per year, to almost five times that for a retired individual, over 65, earning less than $5,000 per year (0.72 percent).

Whether the statistics are reviewed in terms of cost relative to household income or per capita income, the wealthy pay a smaller percent. There is no question that the tax burden is regressive, but then so is the financing of most public investment, whether BART, other public transit, or other public works.

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I. INTRODUCTION

The Economics and Finance Project of the BART Impact Program is designed to contribute to the understanding of what impacts the construction and operation of rapid transit in the Bay Area have had on the region's economy and public finance. The project measures the impacts of expenditures for construction and operation of BART, as well as reviewing the implications of BART service on the efficiency of business operations within the region and the competitive advantage of the region in attracting business and commerce. A major aspect of BART's economic impacts, however, is the manner in which it was financed. The Economics and Finance Project identifies the tax burden of BART's financing, both for construction and operations, and evaluates the impact of capital financing on the cost of borrowing by other public agencies and their willingness to fund other public works projects.

This technical memorandum focuses on the impacts of the public financing of BART's capital and operating outlays. The relative burden of BART's financing has been measured through formulation of a tax incidence assessment model which assigns incidence sectors for each potential tax in a transportation financing plan. BART's financial impact was evaluated with this model, identifying the impact as the difference in local tax burden in the three-county transit district as a result of financing BART, rather than financing the level of transit service which might have occurred in the absence of BART, the No-BART Alternative.

The financing plan for BART is history. The financing plan for the No-BART Alternative (the NBA) was formulated by the Metropolitan Transportation Commission (MTC).[1] This financing plan identifies the increased operating expenditures other agencies would experience in serving larger transit demand, as well as the levels of increased operating revenues or other revenues these agencies would receive in the absence of BART. These financing plans reveal that the only difference in sources of local financing between taxes from BART's construction and operation and the financing of the alternative would be in the property tax and the sales and use tax. Since no increased federal or State funding was projected for local agencies in the absence of BART, there was no increased subsidy from outside the region. Furthermore, there was no change in any other source of tax revenue which would have resulted in a change in the rate of taxation for the region's residents.

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[1] Metropolitan Transportation Commission, "The No-BART Alternative Financing Plan," a Working Note, February 1977.

Although the tax incidence assessment model will permit the evaluation of comprehensive alternative financing plans, for the purposes of this impact analysis, the only features required were those associated with the property tax and the sales and use tax. The model, however, will provide a framework in which other regions can evaluate more complex tax burdens. Nonetheless, the transferability of the impact findings for BART, as opposed to the methodology, is minimal, as any region's tax base is unique. Moreover, BART's financing is highly uncharacteristic, insofar as well over half the cost of BART was borne by the local taxpayers. Since BART, the federal government has embarked on a program of paying as much as 80 percent of the capital costs of new transit systems.

The total tax burden of BART's capital financing depends on the assumptions made concerning the future tax base of the area over the life of the general obligation bonds. The percentage of total land use committed to residential or business activities and the increase in assessed value which will evolve within the three-county district between the present and 1999 will affect the incidence of the tax burden. For this analysis, the future was projected as a mirror of the region's profile in 1976. With completion of the BART Impact Program Land Use and Urban Development Project, these assumptions may change. The Land Use and Urban Development Project will evaluate the actual and projected land use impacts of BART, but will not publish its findings until 1978. At that time, some of these findings may be modified by changing assumptions on future land use patterns and retail sales patterns.

II. THE RESEARCH APPROACH

The research approach used to evaluate the impacts of BART's financing recognizes the objectives of the BART Impact Program, the need to draw from available tax incidence research, estimate the incidence of the BART and No-BART Alternative (NBA) financing plans, and relate the quantitative analysis to a meaningful measure. This section reviews the objectives, the methodology which was proposed, the modifications to that methodology which emerged from interim findings, and the limitations of this research approach.

A. Objectives

A number of projects within the BART Impact Program address the issue of who benefits from BART's service. The objective of this study of the incidence of the tax burden of BART's financing deals very specifically with the question of who pays for BART.

This study is dominated by the question of how the reduction in income which financed BART's construction and continuing operations is distributed among households and other groups of taxpayers. Although the methodology pursues the impacts by evaluating the mechanism of collecting that money, i.e., the property and sales taxes and their bases, the objective of that focus is to determine how individual households were affected by BART's financing, how business and commerce were affected and the implications which the sharing of BART's cost had in terms of equity.

With this dominant theme, the ancillary questions become apparent:

- How much do households pay?

- How is the burden shared between renters and homeowners?
- How much does business pay?
- How much of the cost is paid from sources outside the region?

1. The Impact on Households

This study estimated the share of tax payments borne by the household sectors and the business sectors of the local economy. It also seeks to relate this financial impact to an understandable measure. That measure has been identified as 11 household types, with prototypical expenditure patterns, housing requirements and income.[1] Either the lay reader or the policymaker can evaluate the equity of the burden by using these recognizable examples of income classes.

2. Tax Incidence Model

The research approach acknowledges that BART's continuing financing involves two objects: repayment of the cost of BART's construction and the continuing annual subsidy for BART operations. In each case, the BART impact is the difference between the financing of BART and the financing of regional transit service which would have been provided in the absence of BART, the No-BART Alternative (NBA). Since the financing plan consists primarily of property tax and sales tax differences between BART and the NBA, the tax incidence has been evaluated in terms of those two tax bases only. Nonetheless, a secondary objective in evaluating BART's impacts was to provide the Metropolitan Transportation Commission (MTC) with the framework with which it could evaluate the incidence of more comprehensive financing plans.

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[1] The households are representative of household types that are predominant in the San Francisco-Oakland SMSA. See Appendix B.

3. Geographical Incidence

The specific financing plan for BART and the No-BART Alternative precludes the necessity for geographical distinctions in evaluating the relative impacts. Since the sales tax and property tax are both levied on all three counties in the BART District -- Alameda, Contra Costa and San Francisco -- and these have been identified as the only taxes which differ as a result of BART, there is no need for geographical distinction within the District. The appropriate geographical distinction is drawn between local impacts, within the BART District, and external impacts, which include the remainder of the State or the nation.[1]

Within the three-county district, there are two special assessment districts, which relate to BART's financing. The Series A General Obligation Bonds paid for the local share of undergrounding BART in Berkeley and was repaid from a property tax within that City alone. The second special assessment district, the Market Street Improvement District, was assumed to have occurred in either scenario.

B. Methodology

The methodology for identifying who has paid and will continue to pay for the financial impact of BART leads directly from the means of financing BART and its alternative to the sectors of the regional economy who must bear those costs. This same methodology pursues the incidence of financing BART's construction and its continuing operations.[1]

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[1] The absence of any identified BART-induced changes in public expenditures, either inside or outside the BART District, except those for BART itself, limits the tax burden impact on the three BART Counties. To this extent, unlike the other research of the Economics and Finance Project, the geographic framework is a three-county region, rather than a nine-county region.

1. The Impact Framework

Throughout this study, the BART impact has been identified as the difference between regional transit in the Bay Area with BART and regional transit in the Bay Area without BART. For purposes of defining the difference, the Metropolitan Transportation Commission had identified the No-BART Alternative (NBA), which represents the transit system most likely to have occurred by 1976 if BART had not been implemented.[2]

The NBA consists of improved service by three transit agencies currently operating within the present BART District: Alameda-Contra Costa Rapid Transit District (AC Transit), San Francisco Municipal Railway (MUNI) and the private carrier, Greyhound Bus Lines. The only capital improvement required by these systems to accommodate BART's transit demand in 1976 has been identified as 15 coaches for additional peak-hour service by MUNI.

The burden of the operating costs has been evaluated on the basis of the fiscal 1976 service year, which has been assumed to be a full service year for BART for purposes of the BART Impact Program.

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[1] A more detailed description of the methodology is contained in the Study Design and Project Implementation Plan of the Economics and Finance Project and the Project's Theoretical Framework. See McDonald & Grefe, Inc., "Study Design and Project Implementation Plan for the Economics and Finance Project," a Planning Document prepared for the Metropolitan Transportation Commission, July 1976; and, "Theoretical Framework for the Evaluation of the Economic and Financial Impacts of BART," a Working Note prepared for the Metropolitan Transportation Commission, July 1976.

[2] Metropolitan Transportation Commission, "Rationale and Specification for the No-BART Alternative," Working Note, September 1976; "Estimation of Operating Expenses and Revenues for the No-BART Alternative," Working Note, February 1977; "The No-BART Alternative Financing Plan," Working Note, February 1977.

The tax incidence analysis has been undertaken for the impact of BART, or the difference between the capital and operating financing for the two scenarios. It has not evaluated the tax incidence of BART or the rapid rail system, and the NBA or bus system, independently.

2. Identify the Financing Requirements

The major consideration in determining the magnitude of the tax burden will be the size of the financing requirements. The most apparent financing requirements are the capital and operating costs of BART. These costs were provided by the Metropolitan Transportation Commission.[1]

Other costs which are relevant to spatial differences in the tax burden include BART-induced costs such as local community improvements in the vicinity of BART stations or other public service costs, such as the costs of elementary and secondary education for the children of construction workers who moved into the region. All of these costs would be BART impacts if they would not have occurred under the NBA scenario. Although the complex task of evaluating the tax incidence of these induced costs was considered in the methodology of this study, the Metropolitan Transportation Commission decided that indirect costs would be identified in the BART Impact Program Public Policy Project, and thus this tax burden analysis does not consider them.

3. Formulate Financing Plans

Once the magnitude of the costs which are being financed has been identified, the tax incidence is directly dependent upon the methods of financing which are determined. The sources of BART and NBA financing in a "typical year" are provided by the Metropolitan Transportation Commission.[2]

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[1] Ibid.

[2] Ibid.

4. Identification of Incidence Characteristics

The theoretical framework for the classification of BART's cost by final incidence sector or "burden" follows closely that of conventional public finance theory on the incidence and distributional effects of taxation.[1]

In this approach, the direct payers of each tax are first identified and then, on the basis of theory or empirical evidence, an assumption is made about how the tax payment may be shifted either forward or backward, i.e., will the consumer pay for it in increased prices or will the producer or business sector pay for it in the form of increased costs of doing business, hence lower profit?

Once the assumptions on the incidence of each tax have been made, the total burden and the relative burden to households in different socioeconomic classes can be determined. The total magnitude of the burden can be assigned to business or household sectors for each tax, until a sense of who paid for BART emerges. For the household sector, whether owners or renters, the tax rates can be applied to their normal purchases and property, to identify how the burden differs by a household's situation.

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[1] For a summary and a discussion of both backward and forward incidence of taxation, see Earl R. Rolph and George F. Break, Public Finance, Ronald Press, 1961, pp. 342-347. Conclusions about property tax incidence which have emerged in the past 10 years are discussed in Henry J. Aaron, Who Pays the Property Tax? A New View, The Brookings Institution, 1975. pp. 18-55. The methodology for estimating impacts of the individual taxes follows the theory presented in Dick Netzer, Economics of the Property Tax, Washington, D. C., The Brookings Institute, 1966, pp. 32-59, and John F. Due, Sales Taxation, London, Ruttledge and Keegan Paul, Ltd., 1957, pp. 8-29. For a general discussion of the distributional effects, see John F. Due, Government Finance: Economics of the Public Sector, Richard D. Irwin, New York, 1968, Chapter 8.

The data analysis was complemented by selected interviewing to gain a better understanding of the reaction of business sectors to transferring the tax burden. Once it was possible to identify the behavior of producers and consumers relative to bearing the expense of taxes, it was possible to model the tax incidence characteristics of each revenue source.

This research considered the property tax, the sales and use tax, bridge tolls, highway user taxes, fares and various sources of general revenue funds, all revenue sources which can be expected to play a role in a financing plan for regional transit. The tax incidence characteristics, the methodology for allocating tax burden and the data sources used are described in Appendix A. The financing plans, as they were defined by the BART Impact Program, however, did not require evaluation of any sources but the property and the sales taxes since these were the only revenue sources with local tax burden which differed.

The analysis identifies five groups of taypayers within the region, plus several outside the region, which can be aggregated. Consumers are classified as homeowners, renters and those not otherwise classified (because of inconsistencies in property tax rolls).[1] Business is classified as population-serving industry and basic industry. A portion of the burden is unallocated, representing taxes levied but not paid. Property tax relief reimbursements are included in the export sector, which also includes sales tax on purchases within the District by businesses from outside the region or tourists. The export sector reveals the percentage of the cost of BART which was exported to taxpayers outside the region. Table II-1 illustrates the sectors

While it had originally been proposed that the tax incidence assessment model would be a computer-based mathematical model to permit the testing of alternative financing plans, the relative simplicity of the financing impact -- involving only two taxes -- did not warrant programming the model. Only the property tax and sales tax aspects have been programmed as modular elements of the model.

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[1] This distinction proved unnecessary when the conclusion of the tax incidence research revealed a similar assumption on the burden of property tax borne by either class of household was appropriate.

Table II-1

INCIDENCE SECTORS

Incidence Sector	Property Tax	Sales Tax
Total Households	x	x
Homeowners	x	
Renters	x	
Total Business	x	x
Population-Serving Industry	x	
Basic Industry	x	
Export	x	x
Property Tax Relief	x	
Tourism and Nonlocal Business Purchases		x
Unallocated	x	

Source: McDonald & Grefe, Inc.

5. Quantify Total Burden

Once the tax incidence assessment model or its features have been implemented, the total burden by incidence sector of any financing plan can be derived. The only advantage of determining the total burden by incidence sector is to identify the proportion of the total tax burden borne by different sectors of the economy or borne by consumers, rather than business. Even this total figure, however, is not an easy one for many people to relate to their own situations. As a result, an analysis was proposed of a series of prototypical households against whose expenditure patterns the tax burden could be measured.

6. Illustrate Tax Burden on Different Household Types

The purpose of identifying the tax burden as it affects different prototypical households was both to provide a measure more relevant to the public and to provide a better understanding to the policymaker of the impact various financing sources and the tax system could have on different income levels or age groups. The households used as benchmarks -- and described more fully in Appendix B -- include persons in at least five income categories, as well as typical retired households and low-income households.

The household groups selected for tax burden analysis are summarized in 11 classifications (see Table II-2).

Each household type will have a different income and a different expenditure pattern. The tax burden will be greater or less depending upon the proportion of their income spent on taxable sales and the proportion of their income spent on property tax (whether a homeowner or a renter). This information assists in evaluating the equity of BART's financing.

7. Measuring Tax Burden, Not Transit Financing

The objective of this research is to measure the impact BART's financing had on the burden borne by various classes of taxpayers.

Table II-2

TYPICAL HOUSEHOLD CHARACTERISTICS

	Size of Household	Standard of Living						Head of Household	
		Poverty	Lower	Low-moderate	Moderate	High	Affluent	Over 65, Retired	Female
Individual									
Group 1	1		x					x	
Group 2	1			x					
Couple									
Group 3	2			x					
Group 4	2			x				x	
Group 5	2				x				
Family									
Group 6	3			x					
Group 7	3				x				
Group 8	4	x							x
Group 9	4					x			
Group 10	4						x		
Group 11	6				x				

Source: McDonald & Grefe, Inc.

If the difference between financing BART and financing the NBA did not result in an increase or decrease in a tax rate, there is no impact from BART on the burden of that tax. For example, although toll revenues on the Bay crossings paid for the trans-Bay tube, it has been assumed in the financing plan that the tolls would not have declined in the absence of this use of toll revenues. Therefore, there was no BART impact on the tax burden of the tolls, even though BART used this funding source. On the other hand, there was a public service impact, since the monies would probably have been spent on improvements to the bridges.[1]

As a further example, it has not been suggested that State taxes would go down, nor federal taxes, if State and federal funds had not been spent on BART. Therefore, these sources of financing do not have tax burden impacts. Similarly, any increased deficit on MUNI in the NBA scenario would probably not increase the tax rate in San Francisco. Instead, the funding for MUNI in the NBA would come by the City's deferring expenditures on other programs. Therefore, there is no tax burden impact on the taxpayers of the City, despite the increased cost of service.[2]

C. Limitations

The most significant limitation to the methodology is the limited transferability of both the data, which are specific to the Bay Area, and the findings. Since every region will have a unique financing plan and peculiar tax bases, little but the methodology itself is valid in projecting the burden of financing transit elsewhere.

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[1] MTC determined that the NBA scenario would not include bridge toll rate changes and that the funds would be spent on other bridges outside the region. If it had been spent inside the region, it might have resulted in the NBA improving accessibility and freight flows from increased bridge capacity.

[2] It is within the scope of the Public Policy Project of the BART Impact Program to identify the converse of this issue: What type of public service is being provided at a higher level with BART than would be funded without BART?

1. The Financing Plan

The Economics and Finance Project was originally conceived with the understanding that the alternative to BART, the No-BART Alternative (NBA), represented a research scenario in which there were numerous differences to the economic, financial, transportation, land use and social characteristics of the Bay Area, differences which were direct impacts of BART and many which were indirect or induced. If the alternative scenario involved a change in so many characteristics, it was hypothesized that the financing of public services to a different region would involve minor or even major changes in the levels of taxation required of each of many financing sources. Because of the number of projects and consultants involved in evaluating the impacts of BART on the region, many of the indirect BART impacts which would affect public financing have either not yet been identified or have not been costed. The NBA financing plan involved only the cost differences between BART's financing and the financing of the alternative transportation system. It was decided by MTC that no other costs or financing mechanisms should be considered.

The complexity of the impact findings is naturally conditioned by these limitations on the comprehensiveness of the financing plan. The Study Design proposed a methodology geared to a very different expectation.

2. Deviation from the Study Design

The scope of the financing plan was most influential in changing the methodology. But problems in data availability also had their effect. It had been assumed that the MTC Travel Model System would assist in defining the shifting of the fare burden and toll burden as the modal split shifted in the absence of BART. The model results were not available. As a result the geographic origin of those trips which would revert to auto was not available, preventing a meaningful analysis of this toll/fare burden shift.

It was originally assumed that some modest assumptions could be drawn about shifting land use patterns, hence the shifting of the annual property tax burden between households and business over time. But the Economics and Finance Project was required to assume no change in land use, awaiting outcome of the Land Use and Urban Development Project. Similarly, the change in induced improvements in the vicinity of stations was deemed an element of the Public Policy Project.

Definition of the typical households has been fully documented in Appendix B. These typical households were intended to be representative of different segments of the population, not statistically justified as average households. Evaluation of the impacts of the tax burden in terms of permanent income required socioeconomic analysis of the regional population beyond the resources of this project, and would have required a network of assumptions which would have minimized the relevance of the findings. Therefore, current income was used for measuring the impacts on household income in a given year.

Households were originally to be identified by location within the region. Thus, there was to be a prototypical household identified for each of several locations (San Francisco, Oakland, Hayward, San Leandro, Fremont, Berkeley, Richmond, Orinda, Walnut Creek and Concord). This geographic distinction became irrelevant, however, when no local financing requirements for indirect or induced changes in local expenditures or revenues were provided in the description of the NBA or its financing plan. Since the only differences in BART or NBA financing which affected the region were the property tax and sales tax, which are district-wide, the impact of BART's financing on any household of similar characteristics anywhere in the District (except Berkeley) was exactly the same. In Berkeley each resident household has a slightly greater burden due to the special improvement district which was created to pay for undergrounding the BART tracks. That cost was also financed through the property tax. The elimination of a site-specific household impact description also made the situs of retail sales, intraregionally, moot.

Originally, a mathematical model for the incidence of each of the taxes was proposed, to be implemented on a computer. The full computer model was not developed because it was not warranted by the financing plan. The computer model was also proposed to accommodate certain varying assumptions, such as parametric analysis on the shift of the burden forward to renters. But the research indicates that this parametric analysis is not justified.

The retail shopping patterns element of the Land Use and Urban Development Project is scheduled for completion after the Economics and Finance Project. Thus, this project was unable to take advantage of its findings. Since a sales tax base was required to do the analysis of the impacts on typical households, the wholesale and retail trade sector of the input-output model of the nine-county Bay Area was used to estimate the percentage of taxable sales that were purchased by households, as opposed to businesses, and the proportional representation of the 1974 model was used for the entire period of 1970 through 1976.

For allocating the total burden of BART borne by riders, an analysis was undertaken of the geographical origins and socio-economic characteristics of riders for BART itself. The same data on the other transit agencies were not yet available from the travel model systems. Nor was it possible to get information on the residential locations of users of the Bay Bridge. Therefore, the toll and fare incidence will not be included in the Project scope of work.

3. Transferability

The transferability of the findings of the financial impact of BART depends on the types of taxes used locally to finance transit, the rates of taxation used and the tax bases associated with the three-county BART District and the nine-county region. It is unlikely that any of these conditions will occur elsewhere.

The methodology remains transferable. Appendix A, in discussing tax incidence characteristics, provides the framework with which to evaluate the incidence in other regions. The process could be followed to test the tax incidence elsewhere. It can also be used to revise the tax incidence in the Bay Area, as assumptions change (e.g., land use composition changes).

III. THE TAX BURDEN AND IMPACT OF CONSTRUCTING BART

Any rapid transit system will have two direct impacts on the tax burden of the region's residents: first, the local share of the construction costs and second, the annual deficit paid by the local residents for operations. This section describes the financing plan for building BART and identifies which sectors of the local population bore the burden of paying for BART's construction, or who will have borne that burden by the time the construction bonds have been retired in 1999. The incidence of the tax burden borne by residents of the State generally or the nation is not identified specifically.

A. The Impact of BART's Capital Financing

The impact of BART capital financing is governed by the cost of BART and the methods used to finance that cost. At the time BART was proposed, in 1962, it was to be funded from the sale of $792 million worth of property tax-financed bonds and was to receive $180 million of support from the California Toll Bridge Authority from toll revenue bonds. Rolling stock was to be purchased with nearly $73 million worth of revenue bonds based on operating revenues projected for BART service.

Since then, the costs have escalated and the number of financing sources proliferated. Identifying the costs of BART which represent capital costs is itself a difficult task. The figure most frequently cited is $1.6 billion, based on a report by BART in December 1974, which totaled costs to date for most categories, but used 1972 estimates for completion of construction, engineering and management, and unfunded requirements.[1] Since this figure had been released by BART, it has gained authority over time. A more detailed analysis of actual expenditures for capital requirements -- analysis which did not rely on estimates for portions of the costs -- has revealed a total capital cost closer to $1.5 billion.[1] Since capital improvements are consistently being made to a transit system, it is not surprising that the point at which funding is no longer a capital cost is difficult to determine. This project has identified a cost of $1.524 billion for the construction of BART, based on an analysis of the contract files at BART.[2]

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[1] Bay Area Rapid Transit District, Comparative Cost Report, Oakland, California, December 31, 1974.

The tax incidence analysis considers the sources and uses of funds for BART's capital construction, summarized in Table III-1. There is no controversy over the amount of the general obligation bond issues or their interest requirements, nor the proceeds of the sales tax revenue bonds and their interest requirements. The difference between the total of funding sources cited here and the total of those cited in the BART Comparative Cost Report of 1974 is $108 million, which would bring the total funded estimate to the $1.6 billion level. For this analysis, the difference is taken from "other" sources of financing, such as earnings from temporary investments, Transit Development Act grants, agency agreements; none of these sources has an impact on the local tax burden, since they all represent transfer payments. The difference, then, has no impact on this analysis.

One aspect of the cost reflected in Table III-1 which is not frequently emphasized as a BART capital cost is the total interest expense on each of the bond issues. This interest

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[1] A cost of $1,522 million is cited in "Capital Costs of the San Francisco Bay Area Rapid Transit System," a draft Technical Memorandum prepared by Frederick Merrick and Peat, Marwick, Mitchell and Company for the BART Impact Program and the Metropolitan Transportation Commission, April 1977.

[2] Detailed documentation of this cost estimate is contained in "The Economic Impacts of Bart Capital and Operating Expenditures," a Technical Memorandum prepared for the Metropolitan Transportation Commission by McDonald & Grefe, Inc., June 1977.

Table III-1

THE FINANCING PLAN FOR BART CONSTRUCTION
(Millions of Current Dollars,

Uses of Funds

Use	Amount (000,000s)	
BART Capital Cost Expenditures		1,524
Interest on General Obligation Bonds	714	
Interest on Series "A" Bonds	10	
Interest Cost on Construction or Capital Equipment	38	762
ESTIMATED TOTAL COST		$2,286

Sources of Funds

Source	Amount (000,000s)	
Proceeds of Sale of Property Tax-Financed Bonds	792	
Series "A" Bonds	12	
Interest on Property Tax-Financed Bonds	724	
TOTAL PROPERTY TAX OBLIGATION		1,528
Proceeds of Sales Tax Revenue Bonds	150	
Interest on Sales Tax Revenue Bonds	38	
TOTAL SALES TAX OBLIGATION		188
California Toll Bridge Authority		176
Federal Capital Grants		315
Other[1]		79
Earnings from Temporary Investments		
Transit Development Act Grants		
Agency Agreements		
Real Estate Sales		
Miscellaneous		
TOTAL ESTIMATED SOURCES OF FUNDS		$2,286

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[1] Depending upon the cost estimate used, an additional $108 million of funds is sometimes cited, all allocated to "other" sources. The discrepancy depends on the definition of capital costs. The discrepancy has no impact on the tax incidence analysis, since all "other" sources have only nonlocal impacts.

Sources: McDonald & Grefe, Inc., "The Impacts of BART Capital and Operating Expenditures," A Technical Memorandum prepared for the BART Impact Program, Metropolitan Transportation Commission, June 1977; BART Accounting Department, Schedule of Department Requirements General Obligation Bonds, Schedule of Department Requirements Series "A", and BART Sales Tax Revenue Bonds: Recapitulation (working paper).

expense, which is repaid from the same source as the retirement of the bonds, totals $763 million. A very important early decision in the financial planning of BART, as far as public acceptability of the cost was concerned, was to avoid capitalizing the interest for the bonds. While this interest expense seems substantial, to the credit of BART's financial advisors, it was able to issue its entire bonded indebtedness at an average interest rate of 4.14 percent, barely above the original estimates of four percent.

The impact of BART capital financing, as with any impact, is the difference between BART's capital financing and the capital financing of the No-BART Alternative (NBA). It has been assumed that the NBA would incur no capital costs which would require local financing in order to carry the transit demand in the absence of BART. This assumption means that any BART tax burden is also the full impact of BART.

One possible impact of BART which would have increased the property tax base of the No-BART Alternative was the removal of property tax from the tax rolls through purchase by BART. The total value of BART's property acquisition, however, was only $83 million at cost. This represents an assessed value of approximately one-fifth of one percent of the FY 1976 property tax base in the BART counties. As a result, it was deemed insignificant.[1]

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[1] Among the reasons espoused for rapid transit in BART's early planning and engineering phases was that continued freeway construction had taken large amounts of private property off the tax rolls and that BART would require less land than freeway facilities to carry the same volume of traffic. San Francisco's moratorium on freeway construction and the financial and environmental problems encountered by highway planners may have reduced the significance of this justification, since highways would probably have claimed little land with or without BART over the past fifteen years.

An aspect of BART's financing which is extremely unusual today is the large portion which was funded locally. The local taxpayers have paid or will pay over $1.7 billion in local property and sales taxes for retirement of the BART capital debt and its associated interest. In an era during which the federal government has begun to assume 80 percent of the capital costs of new transit systems, the magnitude of the Bay Area's local commitment is unprecedented and may not be equaled for some time. Thus, the burden of BART's financing on the local taxpayer may serve as an upper limit of what might be experienced elsewhere.

B. The Burden of BART Capital Financing

This section will evaluate the burden of BART's capital financing. The financing plan illustrates the sources of local financing. Virtually the only specifically local sources are property tax and sales and use tax.[1]

1. Property Tax

The primary financing source for BART's construction was an issuance of general obligation bonds worth $792 million, to be repaid by a tax on the property of Alameda, Contra Costa and San Francisco Counties. The property tax also supports the interest payments on those bonds, which total an additional $714 million.[2]

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[1] If the NBA financing plan had reflected capital costs funded by other sources -- whether the object of those costs had been transit improvements or other improvements -- these findings would have included other revenue sources.

[2] This analysis does not consider the amount of property tax levied to support administrative costs during the construction years, although that was minimal, never more than five mills.

The financing requirements of the property tax for the general obligation bonds from 1964 through 1999 are listed in Table III-2. Table III-3 indicates the requirements of Series "A" bonds, which are paid from the property tax in Berkeley alone to pay the local share for the underground alignment.

Who paid the property tax? And who will continue to pay the property tax over the life of BART's bonds? Table III-4 summarizes the projected total incidence of BART's capital financing from property tax, including the Series A bonds, over the life of the bonds, assuming there is no change in the relative proportion of the District's current land uses.

a. Burden Borne by Households

Despite the policy arguments in favor of BART for the economic welfare of the region, the majority of the property tax was paid by households, either directly or as a result of businesses passing BART's incremental taxes on as higher prices. Table III-4 indicates, over the life of the bonds, approximately 64 percent of the property tax will be paid by households.

If the land use patterns of the Bay Area shift over the next 20 years, and the proportion of the total District's assessed value which represents residential land use increases, the percentage of BART's cost borne by households will also increase.

The distinction between homeowners and renters has not proven to be important because of the assumption that both pay equal percentages of the property taxes as consumers of housing. Insofar as homeowners who itemize their tax returns can deduct their taxes, the relative burden to the renter increases.

Table III-2

SCHEDULE OF DEBT REQUIREMENT
GENERAL OBLIGATION BONDS

Redemption Date	Total All Issues		
	Total	Principal	Interest
12/15/64	$ 1,742,337.50		$ 1,742,337.50
6/15/65	2,488,753.80		2,488,753.80
12/15/65	3,190,381.25		3,190,381.25
6/15/66	4,498,691.10		4,498,691.10
12/15/66	4,498,658.90		4,498,658.90
6/15/67	6,570,765.20		6,570,765.20
12/15/67	8,360,858.90		8,360,858.90
6/15/68	10,270,796.90		10,270,796.90
12/15/68	12,211,028.45		12,211,028.45
6/15/69	13,968,316.10		13,968,316.10
12/15/69	17,331,866.05		17,331,866.05
6/15/70	17,403,166.65		17,403,166.65
12/15/70	17,403,139.60		17,403,139.60
6/15/71	17,403,166.65		17,403,166.65
12/15/71	17,403,139.60		17,403,139.60
6/15/72	25,053,166.65	$ 7,650,000.00	17,403,166.65
12/15/72	17,189,264.60		17,189,264.60
6/15/73	26,289,291.65	9,100,000.00	17,189,291.65
12/15/73	16,934,639.60		16,934,639.60
6/15/74	27,534,666.65	10,600,000.00	16,934,666.65
12/15/74	16,637,764.60		16,637,764.60
6/15/75	28,837,791.65	12,200,000.00	16,637,791.65
12/15/75	16,295,764.60		16,295,764.60
6/15/76	30,320,791.65	14,025,000.00	16,295,791.65
12/15/76	15,902,389.60		15,902,389.60
6/15/77	31,552,416.65	15,650,000.00	15,902,416.65
12/15/77	15,476,514.60		15,476,514.60
6/15/78	32,926,541.65	17,450,000.00	15,476,541.65
12/15/78	15,008,939.60		15,008,939.60
6/15/79	34,408,966.65	19,400,000.00	15,008,966.65
12/15/79	14,497,314.60		14,497,314.60
6/15/80	35,872,341.65	21,375,000.00	14,497,341.65
12/15/80	13,932,695.85		13,932,695.85
6/15/81	37,232,722.90	23,300,000.00	13,932,722.90
12/15/81	13,335,927.10		13,335,927.10
6/15/82	38,335,954.15	25,000,000.00	13,335,954.15
12/15/82	12,719,439.60		12,719,439.60
6/15/83	39,469,466.65	26,750,000.00	12,719,466.65
12/15/83	12,070,070.85		12,070,070.85
6/15/84	40,645,097.90	28,575,000.00	12,070,097.90
12/15/84	11,401,039.60		11,401,039.60

Table III-2 (Continued)

SCHEDULE OF DEBT REQUIREMENT
GENERAL OBLIGATION BONDS

Redemption Date	Total All Issues		
	Total	Principal	Interest
6/15/85	41,751,066.65	30,350,000.00	11,401,066.65
12/15/85	10,720,152.10		10,720,152.10
6/15/86	43,120,179.15	32,400,000.00	10,720,179.15
12/15/86	9,996,415.15		9,996,415.15
6/15/87	44,221,447.35	34,225,000.00	9,996,447.35
12/15/87	9,243,365.15		9,243,365.15
6/15/88	45,493,397.35	36,250,000.00	9,243,397.35
12/15/88	8,455,340.15		8,455,340.15
6/15/89	46,855,372.35	38,400,000.00	8,455,372.35
12/15/89	7,621,502.65		7,621,502.65
6/15/90	47,821,534.85	40,200,000.00	7,621,534.85
12/15/90	6,744,315.15		6,744,315.15
6/15/91	40,444,347.35	33,700,000.00	6,744,347.35
12/15/91	6,060,283.90		6,060,283.90
6/15/92	41,035,316.10	34,975,000.00	6,060,316.10
12/15/92	5,348,652.65		5,348,652.65
6/15/93	41,623,684.85	36,275,000.00	5,348,684.85
12/15/93	4,608,840.15		4,608,840.15
6/15/94	42,133,872.35	37,525,000.00	4,608,872.35
12/15/94	3,838,877.65		3,838,877.65
6/15/95	42,888,909.85	39,050,000.00	3,838,909.85
12/15/95	3,033,881.05		3,033,881.05
6/15/96	43,658,856.45	40,625,000.00	3,033,856.45
12/15/96	2,194,489.60		2,194,489.60
6/15/97	44,344,472.90	42,150,000.00	2,194,472.90
12/15/97	1,340,660.50		1,340,660.50
6/15/98	45,015,652.00	43,675,000.00	1,340,652.00
12/15/98	551,500.00		551,500.00
6/15/99	41,676,500.00	41,125,000.00	551,500.00
TOTAL	$1,506,468,933.30	$792,000,000.00	$714,468,933.30

Source: Bay Area Rapid Transit District.

Table III-3

SPECIAL SERVICE DISTRICT NO. 1
SCHEDULE OF DEBT REQUIREMENTS
SERIES "A"
(Berkeley Subway)

Redemption Date	Total	Principal	Interest
12/15/68	$ 463,807.84		$ 463,807.84
6/15/69	278,282.50		278,282.50
12/15/69	278,282.50		278,282.50
6/15/70	498,282.50	220,000.00	278,282.50
12/15/70	272,232.50		272,232.50
6/15/71	502,232.50	230,000.00	272,232.50
12/15/71	265,907.50		265,907.50
6/15/72	505,907.50	240,000.00	265,907.50
12/15/72	259,307.50		259,307.50
6/15/73	509,307.50	250,000.00	259,307.50
12/15/73	252,432.50		252,432.50
6/15/74	512,432.50	260,000.00	252,432.50
12/15/74	245,282.50		245,282.50
6/15/75	515,282.50	270,000.00	245,282.50
12/15/75	237,857.50		237,857.50
6/15/76	517,857.50	280,000.00	237,857.50
12/15/76	230,157.50		230,157.50
6/15/77	520,157.50	290,000.00	230,157.50
12/15/77	222,182.50		222,182.50
6/15/78	522,182.50	300,000.00	222,182.50
12/15/78	213,932.50		213,932.50
6/15/79	523,932.50	310,000.00	213,932.50
12/15/79	205,407.50		205,407.50
6/15/80	535,407.50	330,000.00	205,407.50
12/15/80	196,332.50		196,332.50
6/15/81	536,332.50	340,000.00	196,332.50
12/15/81	189,277.50		189,277.50
6/15/82	549,277.50	360,000.00	189,277.50
12/15/82	181,717.50		181,717.50
6/15/83	551,717.50	370,000.00	181,717.50
12/15/83	173,855.00		173,855.00
6/15/84	563,855.00	390,000.00	173,855.00
12/15/84	165,567.50		165,567.50
6/15/85	575,567.50	410,000.00	165,567.50
12/15/85	156,752.50		156,752.50
6/15/86	576,752.50	420,000.00	156,752.50
12/15/86	147,722.50		147,722.50
6/15/87	587,722.50	440,000.00	147,722.50
12/15/87	138,152.50		138,152.50
6/15/88	598,152.50	460,000.00	138,152.50
12/15/88	128,032.50		128,032.50

Table III-3 (Continued)

SPECIAL SERVICE DISTRICT NO. 1
SCHEDULE OF DEBT REQUIREMENTS
SERIES "A"

Redemption Date	Total	Principal	Interest
6/15/89	608,032.50	480,000.00	128,032.50
12/15/89	117,472.50		117,472.50
6/15/90	617,472.50	500,000.00	117,472.50
12/15/90	106,347.50		106,347.50
6/15/91	626,347.50	520,000.00	106,347.50
12/15/91	94,777.50		94,777.50
6/15/92	634,777.50	540,000.00	94,777.50
12/15/92	82,627.50		82,627.50
6/15/93	652,627.50	570,000.00	82,627.50
12/15/93	69,802.50		69,802.50
6/15/94	659,802.50	590,000.00	69,802.50
12/15/94	56,380.00		56,380.00
6/15/95	676,380.00	620,000.00	56,380.00
12/15/95	42,120.00		42,120.00
6/15/96	682,120.00	640,000.00	42,120.00
12/15/96	27,400.00		27,400.00
6/15/97	697,400.00	670,000.00	27,400.00
12/15/97	14,000.00		14,000.00
6/15/98	714,000.00	700,000.00	14,000.00
TOTAL	$22,284,730.34	$12,000,000.00	$10,284,730.34

Source: Bay Area Rapid Transit District.

Table III-4

BART PROPERTY TAX INCIDENCE FOR CAPITAL DEBT RETIREMENT
DISTRICT TOTAL
1964-1999

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			64.3%
Homeowners	$ 466,270	30.5%	
Renters	192,623	12.6%	
Not Elsewhere Classified[1]	324,096	21.2%	
Total Business			24.8%
Population-Serving Industry	143,703	9.4%	
Basic Industry	235,428	15.4%	
Property Tax Relief	168,163	11.0%	11.0%
Unallocated[2]	- 1,529	- 0.1%	- 0.1%
TOTAL	$1,528,754	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

b. Geographic Distribution of the Tax Burden

The total property tax allocated to each of the BART Counties over the life of the bonds is projected in Table III-5. For reasons which will be discussed in terms of the total burden, it is difficult to relate this allocation to any geographical distribution of benefits.

Table III-5

PROPERTY TAX BURDEN BY COUNTY
BART CAPITAL COSTS, 1964-1999

County	% of Burden
Alameda	41.5
Contra Costa	25.8
San Francisco	32.7
TOTAL	100.0%

Source: McDonald & Grefe, Inc.

Tables III-6 through III-8 illustrate the burden by incidence sector for each County.

The incidence characteristics for Alameda and Contra Costa Counties are extremely similar, with households bearing approximately 60 percent of the total burden. The nature of the burden on business in each county, however, reflects the heavier industrial concentrations in Contra Costa County, at least relative to population-serving industry. Population-serving industries, which are those producers of goods and services serving the regional population can pass a greater proportion of their tax costs on to the consumer.[1] Basic industry -- or that type of production or service which is located within the region on the basis of locational advantages alone, but exports the majority of its goods and services outside the region -- must absorb a greater proportion of its tax burden from BART, since it is competing with firms in locations which do not have that tax burden.

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[1] See Appendix A for quantification of these assumptions.

Table III-6

BART PROPERTY TAX INCIDENCE FOR CAPITAL DEBT RETIREMENT

ALAMEDA COUNTY
1964-1999

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			61.8%
Homeowners	$ 197,990.71	31.2%	
Renters	79,957.79	12.6%	
Not Elsewhere Classified[1]	114,225.41	18.0%	
Total Business			24.2%
Population-Serving Industry	52,670.60	8.3%	
Basic Industry	100,899.11	15.9%	
Property Tax Relief	84,399.89	13.3%	13.3%
Unallocated[2]	4,442.10	0.7%	0.7%
TOTAL	$ 634,585.61	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

Table III-7

BART PROPERTY TAX INCIDENCE FOR CAPITAL DEBT RETIREMENT

CONTRA COSTA COUNTY
1963-1999

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			58.4%
Homeowners	$ 130,006.73	33.0%	
Renters	39,002.02	9.9%	
Not Elsewhere Classified[1]	61,063.72	15.5%	
Total Business			30.8%
Population-Serving Industry	29,350.01	7.5%	
Basic Industry	91,989.62	23.3%	
Property Tax Relief	46,487.26	11.8%	11.8%
Unallocated[2]	- 3,939.60	- 1.0%	- 1.0%
TOTAL	$ 393,959.81	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

Table III-8

BART PROPERTY TAX INCIDENCE FOR CAPITAL DEBT RETIREMENT
SAN FRANCISCO
1963-1999

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			72.5%
Homeowners	$ 139,057.87	27.8%	
Renters	74,030.81	14.8%	
Not Otherwise Classified[1]	149,562.24	29.9%	
Total Business			20.6%
Population-Serving Industry	61,025.40	12.2%	
Basic Industry	42,017.49	8.4%	
Property Tax Relief	36,515.19	7.3%	7.3%
Unallocated[2]	- 2,000.83	- 0.4%	- 0.4%
TOTAL	$ 500,208.17	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

San Francisco's tax burden is distinctly different. San Francisco is an urban center characterized by a large residential population and an economic base focused on professional services and headquarters-type activities. Seventy-two percent of the property tax burden over the life of the bonds would be borne by residents of the City, who would be paying the shifted burden from population-serving industry, as well as their own property tax. Only 21 percent would be paid by industry. Unlike Alameda and Contra Costa Counties, however, the predominance of population-serving industry and the minimal basic industry within the City of San Francisco would result in a larger proportion of the burden borne by business falling on population-serving industry.

While this section deals with who would pay the total burden of the bond financing, to provide an indication of the relative annual burden, the annual BART debt service requirements in 1975-1976 equaled 3.9 percent of the total property tax revenues in Alameda County, 3.7 percent in Contra Costa County and 4.3 percent in San Francisco.

2. Sales and Use Tax

In 1969, the State Legislature authorized a one-half-percent tax on retail sales to finance $150 million worth of BART rolling stock. The funding requirement of this tax will total $188 million over the life of the bonds, including interest costs.

The burden of the capital costs funded by the sales tax, by incidence sector, is summarized in Table III-9. Determination of the incidence was governed by the assumptions on sales tax incidence contained in Appendix A. Further, it was assumed that the pattern of taxable sales existing in fiscal year 1976, i.e., the percentage of retail sales purchased by households or businesses in each of the three counties, was consistent from 1969 to 1976.[1] It has been assumed that 10 percent of the retail sales are tourist purchases or by businesses from outside the

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[1] The methodology used, which is described in Appendix A, depends upon the input-output model formulation of the retail and wholesale trade sector. Only formulation of input-output models for each year would have permitted the assumption of a consistent pattern of taxable purchases over this period to be modified.

Table III-9

FINAL INCIDENCE OF BART CAPITAL COSTS FUNDED BY SALES TAX
BY COUNTY AND DISTRICT
(in Thousands of Current Dollars)
1970-1976

	Alameda	Contra Costa	San Francisco	Total	% of Total
Household	$57,152	$29,516	$45,684	$132,252	70.4%
Business	15,604	8,272	12,972	36,848	19.6%
Export	8,084	4,136	6,580	18,800	10.0%
TOTAL	$80,840	$41,924	$65,236	$188,000	100.0%

Source: McDonald & Grefe, Inc.

region. This assumption may change with the conclusions of the Land Use and Urban Development Project, which will evaluate the impact of BART on retail sales. The input-output model indicates 12 percent of retail sales are made by local businesses.

One quarter of one percent of the sales tax is dedicated to transit projects as a result of the Transportation Development Act (TDA or SB325). This tax is a surrogate for the amount raised by applying the retail sales tax to gasoline. Since the two scenarios assume the same amount of these monies would be spent on transit in the region, and the rate of taxation would not change in the absence of BART, there is no BART impact from TDA funds.[1]

3. Bridge Tolls

Although bridge tolls supported the Toll Bridge Authority's revenue bonds to build BART's trans-Bay tube, it was not assumed in the NBA Scenario[2] that bridge tolls would have decreased. If bridge tolls would not have decreased nor increased in the absence of BART, there was no change or impact to the tax burden within the region because of BART's use of this financing source.

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[1] Metropolitan Transportation Commission, op. cit.

[2] Ibid.

The incidence of this tax may have shifted under the No-BART Alternative, although paucity of data prevented this analysis. If current transit riders were to use their cars in the absence of BART, they would be paying a bridge toll instead of a transit fare. This analysis, however, will require assumptions on the percentages of BART's ridership which would shift to transit, auto or represent induced trips.

4. Highway User Taxes

Highway user taxes support a substantial portion of the highway network within the region. Since the NBA involved no highway improvements other than those which occurred with BART, the regional draw on highway user tax funds did not change, nor did the rate of taxation. Therefore, there was no impact on the tax burden from highway user tax financing.

5. General Revenue Funds

General revenue funds provide the primary support for local government expenditures, including any local improvements or projects which might have occurred in the vicinity of local transit stations. Street improvements, parking lot improvements, parks and other physical improvements to communities through which rapid transit operates would probably have been funded from local general revenue funds. General revenue funds are taken from the general fund of each community, and are supported by the general property tax. For purposes of the research project, however, none of these BART-induced improvements were identified. If they had been, an indirect BART impact would have been the allocation of general revenue funds to BART-related improvements, rather than other government programs. Since it is unlikely the general property tax rate would have increased to fund these improvements, the financing impact would have been in terms of decreased service levels for other programs. Without an increase in the property tax rate or an identification of projects on which there were transfers of funds, however, there is no BART impact from general revenue funding.

6. Total Burden

The total burden of BART's capital costs, considering the incidence of both property and sales taxes which have or will have funded BART's construction, is summarized in Table III-10. The local cost of BART, including interest, will have been $1.7 billion. Sixty-five percent of this cost will have been borne by households through property taxes, rent increments reflecting the property tax or consumer purchases of taxable retail items. Twenty-four percent will have been borne by business and almost 11 percent will be exported to tourists, businesses from outside the region purchasing within the region, and transfers from the State Treasury for property tax exemptions.

Table III-10

TOTAL BURDEN OF BART'S CAPITAL COSTS
THE INCIDENCE OF PROPERTY AND SALES TAXES
1964-1999
(in Thousands of Current Dollars)

	Property Tax	Sales Tax	Total	% of Total
Households	$ 982,989	$132,252	$1,115,241	65.0%
Businesses	379,131	36,848	415,979	24.2
Export	168,163	18,800	186,963	10.9
Unallocated	- 1,529	--	- 1,529	- 0.1
TOTAL	$1,528,754	$188,000	$1,716,754	100.0%

Source: McDonald & Grefe, Inc.

In determining this total burden, two assumptions were made which may be changed by the findings of the Land Use and Urban Development Project. Pending completion of that project, the BART Impact Program decided to assume that the relative proportion of land within each county dedicated to residential or business uses would remain constant between 1976 and 1999. Further, the rate of inflation or appreciation of assessed value within each land use was assumed to be identical during the same period. Together, these assumptions limit the projection of property tax incidence to the characteristics of the region in 1976. There is little question, however, that this profile will change over the next 20 years, and as the Land Use and Urban Development Project identifies the likely changes, the relative proportion of the burden shared by households and businesses will shift.[1]

The equity of the financing plan, relative to ability to pay, is discussed in Section V. It is also possible, however, to make several observations on the geographical equity of the burden. Several measures might be relevant. How much of the construction cost was spent in each county or how much of the economic benefits or economic development which was to follow transit construction accrued to each county? In response to the first, figures are not available for an appropriate allocation of the capital investment to each county. During the planning of BART, however, the costs of the system estimated for each county were roughly comparable to the relationship of the assessed value of each county to the District as a whole.[2] In 1962, the assessed value of Alameda was 38.4 percent of the District total, Contra Costa 23.6 percent and San Francisco 38.0 percent. If construction costs had followed plans, the changing land use patterns have or will have their effect on proportion of the total cost borne by each county. Alameda will pay more than the capital investment it received, as will Contra Costa. San Francisco will pay less.

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[1] It was the decision of the BART Impact Program that independent projections of land use for the Economics and Finance Project or reliance on the regional land use model (ABAG's PLUM) would be premature, while the Land Use and Urban Development Project would be able to commit greater resources to identifying these effects.

[2] McDonald & Smart, Inc., "A History of Key Decisions in the Development of Bay Area Rapid Transit," prepared for the Metropolitan Transportation Commission, September 1975.

This type of analysis ignores the more important economic development issues. Which counties benefited in terms of gaining a competitive advantage in attracting new industry and commerce? The Economics and Finance Project identified virtually no movement into the region as a result of BART, nor economic efficiencies accruing to business.[1] While there may have been shifts within the region as a result of BART, those intraregional spatial impacts are an element of the Land Use and Urban Development Project, rather than this project. Hence, the equities of each county's relative share of the cost on an economic development measure will best be determined by using later findings to determine BART's influence on each county's intraregional share of economic activity.

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[1] McDonald & Grefe, Inc., "Impact of BART on the Competitive Advantage and Efficiency of Bay Area Business Operations," a Technical Memorandum prepared for the Metropolitan Transportation Commission, August 1977.

IV. THE TAX BURDEN AND IMPACT OF FINANCING BART OPERATIONS

The tax burden and impact of constructing BART is BART-specific, since, as was pointed out earlier, a far greater share of BART's cost was met by local taxpayers than is the case elsewhere in the nation. Financing the costs of operating BART, on the other hand, reflects more closely the experience which may be faced by other transit agencies operating rapid-rail transit.

A. The Impact of Financing BART Operations

The costs of operating BART for the "typical" operational year used in this research have been estimated as $55.8 million by the BART Impact Program.[1] Nearly 42 percent of this operating budget was paid from the farebox. The three other local sources of revenue which were primarily responsible for offsetting the BART operating deficit were property tax (for administrative expenses), the sales tax (including the Transportation Development Act funds) and interest. BART also receives some federal funding.

The financing plans used for the incidence analysis of operating revenues were provided by the Metropolitan Transportation Commission, as were the financing plans for the transit systems which would provide transit service in the absence of BART. Table IV-1 represents the BART budget for 1976 used in this analysis. The impact of BART, however, represents the difference between expenditures for BART and the expenditures which would have to be financed in the absence of BART, the No-BART Alternative (NBA).

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[1] Metropolitan Transportation Commission, "The No-BART Alternative Financing Plan," February 1977. This hypothetical level of operating expenditures is less than that used in the economic impact analysis, in which the actual fiscal year expenses of $59.8 million were used for evaluating expenditure impacts.

Table IV-1

1976 BART OPERATING COSTS[1]
(In Thousands of Current Dollars)

Operating Expenditures		$55,853
Operating Revenues		$50,244
Fares	$23,221	
Interest	973	
Property Tax	5,029	
Sales Tax	21,021	
Unfunded Deficit		$ 5,609

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[1] The BART impact on regional transit operating costs is the difference between regional transit costs with BART and without BART. This table illustrates the BART revenues and costs which would not have occurred if BART had not been built.

Source: Metropolitan Transportation Commission, "The No-BART Alternative Financing Plan," February 1977.

Table IV-2

1976 OPERATING COSTS IN THE NBA[1]
AC TRANSIT AND MUNI
(In Thousands of Current Dollars)

	AC Transit	MUNI
Operating Expenditures	$ 1,451	$ 7,726
Operating Revenues	2,350	2,638
Unfunded Deficit	($ 899)	$ 5,088

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[1] The BART impact is defined as the difference between the costs of operating AC Transit and MUNI with BART in operation, and the cost of operating regional bus service without BART.

Source: Metropolitan Transportation Commission, "The No-BART Alternative Financing Plan," February 1977.

The NBA operating costs are summarized in Table IV-2. While MUNI would have an increased deficit, AC Transit would have a surplus without BART, since it would carry more passengers on its profitable long-haul trans-Bay routes. Greyhound would also provide additional service and incur additional losses, but the operating deficits for Greyhound are assumed to have been provided from operating surpluses in other regions served by Greyhound Bus Lines. Therefore, Greyhound service would have no local tax burden impact (although it would be providing a hidden subsidy from other routes, essentially an exported tax burden).

The primary source of AC Transit financing is a property tax in the Alameda-Contra Costa Transit District, which comprises a portion of both Alameda and Contra Costa Counties. MUNI's financing comes from the general fund of the City and County of San Francisco, and it has been assumed that any increased deficit would be financed through a reduction in service in other government programs, rather than an increase in the general property tax.

The BART impact on transit operating costs and revenues or the difference between the costs and revenues from operations with BART or without BART in 1976 is reflected in Table IV-3. As the table indicates, the BART impact has been a reduction in operating costs for both AC Transit and MUNI (of $1.451 million and $7.726 million, respectively), but a significantly higher operating cost for BART ($55.853 million). The BART impact on regional transit operating revenues has been one of lowering the farebox revenue which might have been experienced by AC Transit or MUNI (by $2.350 million and $2.638 million respectively), although BART itself collects over $23 million annually. The net impacts of BART's operations have been an increase of nearly $47 million per year in operating

Table IV-3

BART IMPACT ON THE OPERATING COSTS & FINANCING OF REGIONAL TRANSIT[1]
FY 1976
(In Thousands of Current Dollars)[2]

	AC Transit	MUNI	BART	Net Impact
Operating Expenditures	($1,451)	($7,726)	$55,853	$46,676
Operating Revenues[3]				
Fares and Interest	($2,350)	($2,638)	$23,221	$18,233
Property Tax	$ 899	--	$ 5,029	$ 5,928
Sales Tax	--	--	$21,021	$21,021

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[1] The BART impact on regional transit operating costs is the difference between regional transit costs with BART and without BART. This table illustrates the transit revenues and costs which would not have occurred if BART had not been built.

[2] Numbers in parentheses are negative numbers.

[3] Revenues do not equal expenditures because MUNI's financing has no property tax impact, nor does BART's unfunded deficit have any effect on federal or State tax rates.

Source: Metropolitan Transportation Commission, "The No-BART Alternative Financing Plan," February 1977.

costs, funded by $18 million more in fares, almost $6 million in property taxes and over $21 million in sales tax.

The BART impact on regional transit financing could have had an interesting effect on AC Transit's property tax requirements. Since AC Transit would experience an operating surplus from the additional ridership in the absence of BART, without BART the Alameda-Contra Costa Transit District could lower its tax rate. In other words, the financing requirements for East Bay bus transit are higher with BART operating than they would be without BART (at higher levels of service). While the tax incidence analysis has considered this effect, the Public Policy Project may reveal that a more likely scenario would involve maintaining the current AC Transit tax rate and expanding service.

BART's financing plan also includes nearly $6.6 million of funding from other State or federal sources, including nearly $6.2 million in Transportation Development Act funds. These funds would be allocated to the region even in the absence of BART, although it is to be assumed they would be spent deferring the operating expenses incurred by AC Transit and MUNI. A portion of the TDA funds (almost $2 million) would reduce the unfunded portion of MUNI's costs. An estimated $2.9 million would also go to AC Transit, which could reduce the funds it collects from property tax even farther, or expand service. Until the Public Policy Project establishes the likely course of events, this analysis has held the impact of AC Transit's increased share of TDA funds in abeyance. If service were improved or expanded it might also eliminate the relatively small tax dividend ($899,000) resulting from increased operating revenues.

B. The Burden of the Financial Impact of BART Operations

The question of who pays for BART operations is answered by the incidence characteristics of the property and sales taxes, which represent the only local sources of financing other than fares. For purposes of evaluating the burden of BART's operations, a single year, fiscal year 1975-1976, has been identified as a "typical" operating year.

1. Property Tax

The administrative costs of the BART District are supported by a property tax which is not to exceed five mills under the enabling legislation. In fiscal year 1976, BART raised $5 million for administrative expenses with the property tax. An additional BART impact on the property tax was the higher AC

Transit District property tax necessary to maintain AC Transit service.

Table IV-4 indicates the incidence of annual operating costs supported by the property tax. It is estimated that a majority is still borne by households, with a heavier portion of the burden falling on the households of Alameda and Contra Costa Counties, because of their support of the AC Transit District. Alameda taxpayers bear 44.6 percent of the BART property tax, while 27.7 percent is borne by Contra Costa taxpayers and 27.7 percent is borne by San Francisco taxpayers.

Tables IV-5 through IV-7 describe the incidence of operating revenues in each of the three counties. The cost of operating BART, which is supported by the property tax in each of the three BART counties, is approximately one-half of one percent of the total property tax bill in each county.

As indicated previously, the impact on Alameda-Contra Costa Transit District residents may prove to be even greater than indicated if a portion of the TDA funds currently going to BART were to reduce the operating deficits supported by AC Transit's property tax. If AC Transit were to maintain the current level of service, as indicated in the definition of the NBA, it could reduce the financing requirements from the property tax by $2.9 million, or 19 percent of the total annual AC Transit District tax bill. This course of events would reduce the share of the burden borne by Alameda and Contra Costa taxpayers.

2. Sales and Use Tax

The majority of BART's operating deficit is funded by a half-percent sales tax on retail sales in the three BART counties.

Table IV-4

BART'S IMPACT ON THE BURDEN OF THE PROPERTY TAX IN THE DISTRICT OPERATING REQUIREMENTS FY1976

(In Thousands of Current Dollars)

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			63.9%
Homeowners	$1,819.4	30.7%	
Renters	743.1	12.5%	
Not Elsewhere Classified[1]	$1,227.0	20.7%	
Business			24.8%
Population-Serving Industry	545.5	9.2%	
Basic Industry	925.6	15.6%	
Export			11.3%
Property Tax Relief	669.2	11.3%	
Unallocated[2]	- 1.5	0.0%	0.0%
TOTAL	$5,928.3	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

Table IV-5

BART'S IMPACT ON THE BURDEN
OF THE PROPERTY TAX IN ALAMEDA COUNTY
OPERATING REQUIREMENTS FY1976

(In Thousands of Current Dollars)

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			61.8%
Homeowners	$ 891.3	31.2%	
Renters	360.0	12.6%	
Not Elsewhere Classified[1]	514.2	18.0%	
Business			24.2%
Population-Serving Industry	283.3	8.3%	
Basic Industry	453.9	15.9%	
Export			13.3%
Property Tax Relief	380.3	13.3%	
Unallocated[2]	19.5	0.7%	0.7%
TOTAL	$2,857.5	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

Table IV-6

BART'S IMPACT ON THE BURDEN OF THE PROPERTY TAX IN CONTRA COSTA COUNTY OPERATING REQUIREMENTS FY1976

(In Thousands of Current Dollars)

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			58.4%
Homeowners	$ 470.9	33.0%	
Renters	141.3	9.9%	
Not Elsewhere Classified[1]	220.9	15.5%	
Business			30.7%
Population-Serving Industry	106.0	7.4%	
Basic Industry	332.8	23.3%	
Export			11.8%
Property Tax Relief	168.1	11.8%	
Unallocated[2]	- 13.9	- 0.9%	- 0.9%
TOTAL	$1,426.1	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

Table IV-7

BART'S IMPACT ON THE BURDEN OF THE PROPERTY TAX IN SAN FRANCISCO OPERATING REQUIREMENTS FY1976

(In Thousands of Current Dollars)

Incidence Sector	Total (in thousands)	Percent of Total	
Total Households			72.4%
Homeowners	$ 457.2	27.8%	
Renters	241.8	14.7%	
Not Elsewhere Classified[1]	491.9	29.9%	
Business			20.7%
Population-Serving Industry	201.2	12.2%	
Basic Industry	138.9	8.5%	
Export			7.3%
Property Tax Relief	120.8	7.3%	
Unallocated[2]	- 7.1	- 0.4%	- 0.4%
TOTAL	$1,644.7	100.0%	100.0%

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[1] Not classified as homeowners or renters due to data discrepancies in homeowner exemption.

[2] Unallocated represents taxes levied but not collected.

Source: McDonald & Grefe, Inc.

For the "typical" BART operating year, the BART financing plan indicates $21.021 million were spent on operations from sales tax revenues. Applying the methodology outlined in Appendix A, the final incidence of the sales tax burden has been estimated in Table IV-8.

Table IV-8

FINAL INCIDENCE OF SALES TAX BY COUNTY AND DISTRICT
BART FY1976 OPERATING BUDGET

(In Thousands of Current Dollars)

	Counties				
	Alameda	Contra Costa	San Francisco	Total	Percent of Total
Household	$ 6,390	$ 3,300	$ 5,108	$ 14,798	70.4%
Business	1,745	925	1,451	4,121	19.6%
Export	904	462	736	2,102	10.0%
TOTAL	$ 9,039	$ 4,687	$ 7,295	$ 21,021	100.0%

Source: McDonald & Grefe, Inc.

3. Fares and Bridge Tolls

In the absence of data on the riders under the No-BART Alternative, any analysis of the BART patronage alone would not represent the true impact of BART on the proportion of operating expenses paid by transit riders. Nonetheless, cross tabulations of the 1976 BART Passenger Profile Survey indicate certain socioeconomic characteristics of the BART patron. The Passenger Profile Survey was distributed to a sample of 12,210 patrons on station platforms. The survey was conducted at three to five stations each day over a period of seven days. Patrons returned 8,985 questionnaires.[1]

Table IV-9 classifies survey responses by commuters and noncommuters. The table indicates peak and off-peak statistics and the daytime total. One of the interesting observations is that BART utilization by noncommuters and during the off-peak hours was substantial, compared to the commute patronage. The commuter tended to have a higher average fare and paid almost 58 percent of the total farebox revenue for daytime travel. Table IV-10 indicates that nearly 91 percent of the riders during the daytime were also residents of the BART District. In other words, those who were bearing the BART cost through the sales and property taxes were not subsidizing, to any great degree, residents of other regions that use the system. During the peak period, the percentage of riders who were from outside the BART District reached an adjusted high of 11 percent.

Almost 71.5 percent of the peak period passengers who classified themselves by income earned more than $10,000 per year (see Table IV-11). Among the total daytime patronage, nearly 65 percent of the respondents classified their income as exceeding $10,000. Moreover, the average fare paid by passengers increases with income group. While this does not necessarily address the issue of equity, since it may reflect BART's inability to attract lower-income patrons on the longer rides that have a higher fare, it does project a profile of middle-class patronage, and largely white.

Table IV-12 summarizes the BART fare payments by ethnic characteristics. The profile it establishes is more a socioeconomic

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[1] "1976 BART Passenger Profile Survey: Field Methods and Processing Procedures," a Data Document prepared by the Metropolitan Transportation Commission, September 1976.

TABLE IV-9

BART FARE PAYMENTS BY COMMUTERS & NON-COMMUTERS

CATEGORY	UNWEIGHTED RESPONSES					RESPONSE WEIGHTED FOR SAMPLING RATIO AND RESPONSE RATE VARIATIONS				
	NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID	NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID
PEAK PERIOD										
COMMUTERS	3674.	86.0	$ 2836.	87.9	$ .77	39069.	87.1	$ 29665.	88.0	$ .76
OTHERS	596.	14.0	$ 392.	12.1	$ .66	5766.	12.9	$ 4064.	12.0	$ .70
TOTAL	4270.	100.0	$ 3227.	100.0	$ .76	44834.	100.0	$ 33729.	100.0	$ .75
OFF PEAK										
COMMUTERS	1104.	28.6	$ 777.	28.7	$ .70	12581.	26.9	$ 8949.	27.1	$ .71
OTHERS	2760.	71.4	$ 1934.	71.3	$ .70	34109.	73.1	$ 24026.	72.9	$ .70
TOTAL	3864.	100.0	$ 2710.	100.0	$ .70	46690.	100.0	$ 32976.	100.0	$ .71
DAY TIME TOTAL										
COMMUTERS	4778.	58.7	$ 3613.	60.8	$ .76	51649.	56.4	$ 38615.	57.9	$ .75
OTHERS	3356.	41.3	$ 2325.	39.2	$ .69	39875.	43.6	$ 28090.	42.1	$ .70
TOTAL	8134.	100.0	$ 5938.	100.0	$ .73	91524.	100.0	$ 66705.	100.0	$ .73

Source: McDonald & Grefe, Inc.

TABLE IV-10

BART FARE PAYMENTS BY ORIGIN CITY

CATEGORY	UNWEIGHTED RESPONSES					RESPONSE WEIGHTED FOR SAMPLING RATIO AND RESPONSE RATE VARIATIONS				
	NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID	NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID
PEAK PERIOD										
BART AREA RESIDENT	4000.	93.7	$ 3052.	94.6	$ .76	38842.	86.6	$ 29957.	88.8	$ .77
OTHER	270.	6.3	$ 176.	5.4	$ .65	5992.	13.4	$ 3772.	11.2	$ .63
TOTAL	4270.	100.0	$ 3227.	100.0	$ .76	44834.	100.0	$ 33729.	100.0	$ .75
OFF PEAK										
BART AREA RESIDENT	3642.	94.3	$ 2547.	94.0	$ .70	43630.	93.4	$ 30681.	93.0	$ .70
OTHER	222.	5.7	$ 163.	6.0	$ .73	3060.	6.6	$ 2294.	7.0	$ .75
TOTAL	3864.	100.0	$ 2710.	100.0	$ .70	46690.	100.0	$ 32976.	100.0	$ .71
DAY TIME TOTAL										
BART AREA RESIDENT	7642.	94.0	$ 5599.	94.3	$ .73	82472.	90.1	$ 60638.	90.9	$ .74
OTHER	492.	6.0	$ 339.	5.7	$ .69	9052.	9.9	$ 6066.	9.1	$ .67
TOTAL	8134.	100.0	$ 5938.	100.0	$ .73	91524.	100.0	$ 66705.	100.0	$ .73

Source: McDonald & Grefe, Inc.

TABLE IV-11

BART FARE PAYMENTS BY INCOME

CATEGORY	UNWEIGHTED RESPONSES					RESPONSE WEIGHTED FOR SAMPLING RATIO AND RESPONSE RATE VARIATIONS				
	NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID	NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID
PEAK PERIOD										
UNDER $7000	516.	12.1	$ 333.	10.3	$ .64	4878.	10.9	$ 3295.	9.8	$ .68
$7000 TO 9999	470.	11.0	$ 321.	9.9	$ .68	4875.	10.9	$ 3274.	9.7	$ .67
$10000 TO 14999	725.	17.0	$ 537.	16.6	$ .74	7798.	17.4	$ 5670.	16.8	$ .73
$15000 TO 19999	600.	14.1	$ 454.	14.1	$ .76	6326.	14.1	$ 4769.	14.1	$ .75
$20000 TO 24999	649.	15.2	$ 529.	16.4	$ .81	6902.	15.4	$ 5472.	16.2	$ .79
$25000 TO 49999	803.	18.8	$ 702.	21.8	$ .87	8539.	19.0	$ 7414.	22.0	$ .87
$50000 OR MORE	86.	2.0	$ 81.	2.5	$ .94	848.	1.9	$ 801.	2.4	$ .94
NOT IDENTIFIED	421.	9.9	$ 271.	8.4	$ .64	4669.	10.4	$ 3034.	9.0	$ .65
TOTAL	4270.	100.0	$ 3227.	100.0	$ .76	44834.	100.0	$ 33729.	100.0	$ .75
OFF PEAK										
UNDER $7000	911.	23.6	$ 576.	21.2	$ .63	11018.	23.6	$ 7064.	21.4	$ .64
$7000 TO 9999	413.	10.7	$ 276.	10.2	$ .67	5182.	11.1	$ 3480.	10.6	$ .67
$10000 TO 14999	601.	15.6	$ 413.	15.2	$ .69	7425.	15.9	$ 5105.	15.5	$ .69
$15000 TO 19999	445.	11.5	$ 337.	12.4	$ .76	5254.	11.3	$ 3965.	12.0	$ .75
$20000 TO 24999	421.	10.9	$ 335.	12.4	$ .80	5125.	11.0	$ 4155.	12.6	$ .81
$25000 TO 49999	499.	12.9	$ 394.	14.5	$ .79	5854.	12.5	$ 4661.	14.1	$ .80
$50000 OR MORE	97.	2.5	$ 77.	2.9	$ .80	1069.	2.3	$ 852.	2.0	$ .80
NOT IDENTIFIED	477.	12.3	$ 302.	11.1	$ .63	5762.	12.3	$ 3694.	11.2	$ .64
TOTAL	3864.	100.0	$ 2710.	100.0	$ .70	46690.	100.0	$ 32976.	100.0	$ .71
DAY TIME TOTAL										
UNDER $7000	1427.	17.5	$ 908.	15.3	$ .64	15896.	17.4	$ 10359.	15.5	$ .65
$7000 TO 9999	883.	10.9	$ 597.	10.1	$ .68	10057.	11.0	$ 6754.	10.1	$ .67
$10000 TO 14999	1326.	16.3	$ 950.	16.0	$ .72	15223.	16.6	$ 10775.	16.2	$ .71
$15000 TO 19999	1045.	12.8	$ 791.	13.3	$ .76	11580.	12.7	$ 8733.	13.1	$ .75
$20000 TO 24999	1070.	13.2	$ 864.	14.6	$ .81	12027.	13.1	$ 9627.	14.4	$ .80
$25000 TO 49999	1302.	16.0	$ 1096.	18.5	$ .84	14393.	15.7	$ 12075.	18.1	$ .84
$50000 OR MORE	183.	2.2	$ 159.	2.7	$ .87	1917.	2.1	$ 1652.	2.5	$ .86
NOT IDENTIFIED	899.	11.0	$ 572.	9.6	$ .64	10431.	11.4	$ 6729.	10.1	$ .65
TOTAL	8134.	100.0	$ 5938.	100.0	$ .73	91524.	100.0	$ 66705.	100.0	$ .73

Source: McDonald & Grefe, Inc.

TABLE IV-12

BART FARE PAYMENTS BY RACE

CATEGORY	UNWEIGHTED RESPONSES NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID	RESPONSE WEIGHTED FOR SAMPLING RATIO AND RESPONSE RATE VARIATIONS NO. OF RESPONSES	PERCENT OF TOTAL RESPONSES	AMOUNT PAID	PERCENT OF TOTAL PAID	AVERAGE FARE PAID
PEAK PERIOD										
ASIAN	330.	7.7	$ 238.	7.4	$ .72	4014.	9.0	$ 2866.	8.5	$ .71
BLACK	385.	9.0	$ 270.	8.4	$ .70	4815.	10.7	$ 3368.	10.0	$ .70
SPANISH AMERICAN	200.	4.7	$ 133.	4.1	$ .66	2418.	5.4	$ 1566.	4.6	$ .65
WHITE	3062.	71.7	$ 2392.	74.1	$ .78	30322.	67.6	$ 23771.	70.5	$ .78
OTHER	51.	1.2	$ 41.	1.3	$ .80	650.	1.5	$ 505.	1.5	$ .77
NOT IDENTIFIED	242.	5.7	$ 155.	4.8	$ .64	2604.	5.8	$ 1653.	4.9	$ .63
TOTAL	4270.	100.0	$ 3227.	100.0	$ .76	44834.	100.0	$ 33729.	100.0	$ .75
OFF PEAK										
ASIAN	246.	6.4	$ 162.	6.0	$ .66	3110.	6.7	$ 2031.	6.2	$ .65
BLACK	337.	8.7	$ 216.	7.6	$ .61	4845.	10.4	$ 2967.	9.0	$ .61
SPANISH AMERICAN	213.	5.5	$ 130.	4.8	$ .61	2736.	5.9	$ 1682.	5.1	$ .61
WHITE	2745.	71.0	$ 2009.	74.1	$ .73	31880.	68.3	$ 23606.	71.6	$ .74
OTHER	53.	1.4	$ 35.	1.3	$ .66	920.	2.0	$ 635.	1.9	$ .69
NOT IDENTIFIED	270.	7.0	$ 169.	6.2	$ .63	3198.	6.8	$ 2053.	6.2	$ .64
TOTAL	3854.	100.0	$ 2710.	100.0	$ .70	46690.	100.0	$ 32976.	100.0	$ .71
DAY TIME TOTAL										
ASIAN	576.	7.1	$ 399.	6.7	$ .69	7124.	7.8	$ 4897.	7.3	$ .69
BLACK	722.	8.9	$ 475.	8.0	$ .66	9660.	10.6	$ 6336.	9.5	$ .66
SPANISH AMERICAN	413.	5.1	$ 263.	4.4	$ .64	5155.	5.6	$ 3248.	4.9	$ .63
WHITE	5807.	71.4	$ 4401.	74.1	$ .76	62203.	68.0	$ 47376.	71.0	$ .76
OTHER	104.	1.3	$ 76.	1.3	$ .73	1580.	1.7	$ 1141.	1.7	$ .72
NOT IDENTIFIED	512.	6.3	$ 324.	5.5	$ .63	5802.	6.3	$ 3706.	5.6	$ .64
TOTAL	8124.	100.0	$ 5938.	100.0	$ .73	91524.	100.0	$ 65705.	100.0	$ .73

Source: McDonald & Grefe, Inc.

conclusion of BART's service for minority travel, than an opportunity for identifying the actual incidence of the farebox revenue.

4. Total Burden

The impact of BART's operations on tax burden within the region is summarized in Table IV-13. This table summarizes the final incidence of the sales tax and property taxes necessary for supporting BART operations. It answers the broad question of who pays for BART's operations, in addition to those who ride it.

Table IV-13

FINAL INCIDENCE OF OPERATING REVENUES[1]
BART IMPACT IN FY 1976

(In Thousands of Current Dollars)

	Property Tax	Sales Tax	Total	% of Total
Household	$3,790	$14,798	$ 18,588	69.0%
Business	1,471	4,121	5,591	20.7%
Export	669	2,102	2,771	10.3%
Unallocated	- 2	--	- 2	0.0%
TOTAL	$5,928	$21,021	$26,948	100.0%

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[1] This table aggregates the data from Tables III-4 through III-8 and IV-4 through IV-7, including both property taxes and sales taxes.

Source: McDonald & Grefe, Inc.

Sixty-nine percent of the annual operating deficit is paid by households, as homeowners, renters or consumers. The type of impact this financing plan has on individual households of different income levels is summarized in the next section.

Business bears the cost of nearly 21 percent of BART's operations. When the final incidence falls on business, it implies that the burden has not been shifted forward to the consumer, but rather borne as a cost of doing business. Slightly more than 10 percent of the cost of BART which is funded with local taxes is actually exported.

V. FINAL INCIDENCE OF BART COSTS FOR TYPICAL HOUSEHOLDS

The impact of BART's financing on the income of a range of typical households -- with different incomes, family sizes and consumption patterns -- was measured to provide an indicator of the progressivity or regressivity of the financing and the relative magnitude of the burden. A representative range of household sizes, incomes and age groups was selected for this purpose. Appendix B documents the methodology for describing representative households, which, because of the uniform BART taxes in the three counties of the district, could be located anywhere in the district. These calculations of tax burden are in addition to the various local taxes where the household may reside.

The tax incidence for BART capital expenses and operating expenses was analyzed as a percentage of household income. The burden for the typical households is shown in Table V-1 for BART capital costs and in Table V-2 for BART operating costs.

An important criterion in evaluating alternative financing plans is the equity of a tax, or its taxing of individuals or households in direct proportion to their ability to pay. According to this criterion, a more equitable tax would represent at least the same proportion of the income of every household.

A tax in which the same rate is applied to all households, regardless of circumstances, will tend to be regressive, or unfavorable to those with the least ability to pay. This regressive characteristic is the result of both a lower income and the need to spend a greater proportion of that income on essential consumption, such as housing, food and clothing.

Here, the regressive nature of BART financing can be seen most clearly. The financing of both capital and operating costs of BART shows a pattern of decreasing burden as a percent of household income, as household income increases. The greatest relative burden of financing capital costs, in this analysis, falls on the group represented by an individual with low-moderate living standard (Group 2). Similarly, a high relative burden is borne by a poverty-level family of four (Group 8). The affluent family of four has the lowest relative tax burden for the financing of either capital or operating expenses.

Similarly, in Table V-4, the typical households are presented in order of increasing per capita household income. Using this measure, the tax burden appears somewhat less regressive. However, the five typical households with the lowest per capita incomes have a considerably higher tax burden for both BART capital costs and BART operating costs.

The average capital financing burden is 0.57 percent of household income for the five groups with the lowest per capita household incomes, while the six groups with the highest per capita household incomes have a burden of 0.34 percent of household income. This pattern is also apparent in the burden of operating costs: the six groups with the lowest per capita household incomes bear an average burden of 0.20 percent of household income, while the six highest bear a burden of only 0.14 percent.

The tax burden defined here should be recognized as a comparative measure, not an absolute one. Every household, depending on its housing and consumption patterns, will bear a different burden. This description of the burden by "typical" household characteristics is a more meaningful measure of tax burden than merely the statistical value of total regional per capita financing cost (which is $29.25), since the burden on these 11 representative households addresses the equity issues.

Table V-1

TAX BURDEN OF TYPICAL HOUSEHOLDS FOR BART CAPITAL EXPENSES IN TYPICAL YEAR (1976)

Group No.	Income	Household Description	Property Tax	Sales Tax	Total Tax Burden	Tax Burden As Percent of Income
1	$ 4,489	Individual, lower living standard, over 65, retired	$22.54	$ 9.86	$32.90	0.72%
2	$10,041	Individual, low-moderate living standard	$15.98	$15.97	$31.95	0.32%
3	$10,277	Couple, low-moderate living standard	$34.14	$16.44	$50.58	0.49%
4	$ 6,851	Couple, low-moderate living standard, head over 65	$24.18	$14.09	$38.27	0.56%
5	$15,711	Couple, moderate living standard	$35.38	$21.13	$56.51	0.36%
6	$ 8,859	Family of 3, low-moderate living standard	$34.14	$16.44	$50.58	0.57%
7	$14,411	Family of 3, moderate living standard	$34.14	$16.44	$50.58	0.35%
8	$ 2,362	Family of 4, poverty-level living standard, female head of household	$10.93	$ 4.70	$15.63	0.66%
9	$21,735	Family of 4, high living standard	$40.99	$29.12	$70.11	0.32%
10	$45,715	Family of 4, affluent living standard	$71.86	$39.45	$111.31	0.24%
11	$18,191	Family of 6, moderate living standard	$39.90	$26.38	$66.28	0.36%

Source: McDonald & Grefe, Inc.

Table V-2

TAX BURDENS OF TYPICAL HOUSEHOLDS FOR BART OPERATING EXPENSES IN TYPICAL YEAR (1976)

Group No.	Household Description	Income	Property Tax	Sales Tax	Total Tax Burden	Tax Burden as Percent of Income
1	Individual, lower living standard, over 65 retired	$ 4,489	$2.68	$ 8.30	$10.98	0.24%
2	Individual, low-moderate living standard	$10,041	$1.90	$13.44	$15.34	0.15%
3	Couple, low-moderate living standard	$10,277	$4.06	$13.83	$17.89	0.17%
4	Couple, low-moderate living standard, head over 65	$ 6,851	$2.87	$11.86	$14.73	0.21%
5	Couple, moderate living standard	$15,711	$4.20	$17.79	$21.99	0.14%
6	Family of 3, low-moderate living standard	$ 8,859	$4.06	$13.83	$17.89	0.20%
7	Family of 3, moderate living standard	$14,411	$4.06	$13.83	$17.89	0.12%
8	Family of 4, poverty-level living standard, female head of household	$ 2,362	$1.30	$ 3.95	$ 5.25	0.22%
9	Family of 4, high living standard	$21,735	$4.86	$24.50	$29.36	0.13%
10	Family of 4, affluent living standard	$45,715	$8.53	$33.20	$41.73	0.09%
11	Family of 6, moderate living standard	$18,191	$4.70	$22.20	$26.90	0.15%

Source: McDonald & Grefe, Inc.

Table V-3

TYPICAL HOUSEHOLD TAX INCIDENCE BY HOUSEHOLD INCOME FOR BART CAPITAL AND OPERATING EXPENSES

Group No.	Household Income	Household Description	Capital Cost Tax Burden as % of Household Income	Operating Cost Tax Burden as % of Household Income
8	$ 2,362	Family of 4, poverty-level living standard, female head of household	0.66%	0.22%
1	$ 4,489	Individual, lower living standard, over 65, retired	0.72%	0.24%
4	$ 6,851	Couple, low-moderate living standard, head over 65	0.56%	0.21%
6	$ 8,859	Family of 3, low-moderate living standard	0.57%	0.20%
2	$10,041	Individual, low-moderate living standard	0.32%	0.15%
3	$10,277	Couple, low-moderate living standard	0.49%	0.17%
7	$14,411	Family of 3, moderate living standard	0.35%	0.12%
5	$15,711	Couple, moderate living standard	0.36%	0.14%
11	$18,191	Family of 6, moderate living standard	0.36%	0.15%
9	$21,735	Family of 4, high living standard	0.32%	0.13%
10	$45,715	Family of 4, affluent living standard	0.24%	0.09%

Source: McDonald & Grefe, Inc.

Table V-4

TYPICAL HOUSEHOLD TAX INCIDENCE BY PER CAPITA INCOME FOR BART CAPITAL AND OPERATING EXPENSES

Group No.	Per Capita Income	Household Description	Tax Burden for Capital Expenses as % of Household Income	Tax Burden for Operating Costs as % of Household Income
8	$ 591	Family of 4, poverty-level living standard, female head of household	0.66%	0.22%
6	$ 2,953	Family of 3, low-moderate living standard	0.57%	0.20%
11	$ 3,032	Family of 6, moderate living standard	0.36%	0.15%
4	$ 3,426	Couple, low-moderate living standard, head over 65	0.56%	0.21%
1	$ 4,482	Individual, lower living standard, over 65, retired	0.72%	0.24%
7	$ 4,804	Family of 3, moderate living standard	0.35%	0.17%
3	$ 5,139	Couple, low-moderate living standard	0.35%	0.17%
9	$ 5,434	Family of 4, high living standard	0.32%	0.13%
5	$ 7,856	Couple, moderate living standard	0.36%	0.14%
2	$10,041	Individual, low-moderate living standard	0.32%	0.15%
10	$11,429	Family of 4, affluent living standard	0.24%	0.09%

Source: McDonald & Grefe, Inc.

VI. EXPECTATIONS, REALITY AND CONCLUSIONS

Many of the expectations of BART in 1962 represent arguments for rapid urban mass transit which are still articulated by regions seeking to revitalize their urban cores. The implications of the tax incidence findings can be helpful in reviewing misconceived expectations for BART and seeking policy conclusions relevant to expectations for future systems.

A. The Expectations of BART and the Reality

In May 1962, the Bay Area Rapid Transit District published "The Composite Report," a report describing the engineering, financial and economic basis of a rapid transit plan for Alameda, Contra Costa and San Francisco Counties. The report was prepared by the general engineering consultants, Parsons Brinckerhoff-Tudor-Bechtel; Smith, Barney & Company, financial consultants; Stone and Youngberg, financial advisors; and Van Beuren Stanbery, economic consultant. Among the implications of rapid transit which were outlined for the voters was a projected financial burden for constructing and operating BART. This section reviews those expectations and compares the reality.

1. Capital and Operating Costs

Two miscalculations in the planning of BART are more responsible than any others for the variance between the financial planning and the actual impacts. First, BART's capital cost (excluding interest on the bonds) was not $972,000,000 (plus $72 million for rolling stock), but $1,524,000,000. Secondly, the optimistic projections of operating surpluses, based on underestimates of operating cost and overestimates of patronage and representing a key element in the financing plan, failed to materialize even as the cost of rolling stock escalated to $150 million.

2. The Estimated Tax Rate

Smith, Barney estimated that the District's financial plan would result in a maximum District property tax rate of 70.8 cents per $100 assessed value, although more probably the rate would not exceed 67.3 cents per $100 assessed value in the year with the greatest requirements, fiscal year 1972. This rate was for bond retirement and interest only.

The actual rate in fiscal year 1972 was 58.7 cents per $100 assessed value in Alameda County, 61.4 cents in Contra Costa County, and 65.1 cents in San Francisco.[1]

For fiscal year 1976, the cost of debt service had been estimated in the Composite Report to be 66.4 cents per $100 assessed value. Yet this past year, fiscal year 1976, the rate was set at 40 cents. The actual rates, which have been lower than projected rates, reflect increases in assessed valuation considerably in excess of projections contained in the Composite Report.

3. Estimated Annual Costs to Typical Homeowner for Capital Investment

The Composite Report had indicated a probable median value of a single-family home within the District to be $16,000. Based on this estimate, the maximum annual cost of transit district bonds to the typical homeowner would have been $27.00.

This calculation in the Composite Report applied the maximum tax rate to the median value of the home in 1962, without appreciating that home to the year of maximum cost. Applying the same appreciation rate used for the assessed value calculations in the Composite Report, the value of that home in fiscal year 1976 would be nearly $24,500. Applying the projected fiscal year 1976 tax rate would have resulted in a projected annual cost of almost $41.00 for the typical homeowner.

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[1] The rate variation among the counties reflects equalization of the rate because of variations in the assessment ratio in each county.

In 1976, the average sale price for homes in Alameda County was nearly $46,000, in Contra Costa nearly $54,000, and in San Francisco, slightly over $55,000.[1] Based on these actual sales averages, and the actual tax rate, the annual cost to the average homeowner would be $48.00 in Alameda County, $54.00 in Contra Costa County, and $62.00 per year in San Francisco County. While this indicates the costs to the homeowner as a homeowner, it does not reflect the total cost of servicing BART's capital construction debt. The cost the homeowner must pay as a consumer, in terms of sales tax, would be additional.

4. BART Taxes as a Percentage of Local Taxes

In the Composite Report, Smith, Barney & Company had projected that the BART District bond rate would represent 7.65 percent of the tax rate for the three Bay Area counties. In 1976, the tax collections for BART's general obligation bonds represented 3.97 percent of the regional property tax total. Again, this represents the tax rate for retiring the capital bonds only (and does not include the five mills levied for administrative expenses), nor does it reflect the additional property tax paid by residents in the Alameda-Contra Costa Transit District for unprofitable bus service which would not occur in the absence of BART. The tax dividend residents of Alameda-Contra Costa Transit District could receive in the absence of BART is estimated at 2.4 mills or 4.5 percent of AC Transit's total levy.

The discrepancy between the projection and the reality is a function of the dramatically increasing costs of other government services.

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[1] Real Estate Research Council of Northern California Bulletin 28, No. 1, citing the six-month average for January 1, 1976.

5. Tax Levied Per Capita

The Composite Report estimated a regional tax levy per capita of approximately $17.00 annually between 1973 and 1988. In fiscal year 1976, the levy per capita for retiring the general obligation bonds alone was $18.64, while the total local financing cost per capita for BART construction (including the sales tax) was $29.25.

6. A Composite Report for 1976

BART cost more than anticipated. Since property values increased in the three BART counties at a rate far in excess of the projected rate, the property tax rates for retiring $792 million worth of bonds has been less than anticipated. The total tax bill in 1976 for the average homeowner, however, has been higher than projected, because of the increased cost of the average home. Nonetheless, BART property taxes in 1976 were a smaller percentage of total property taxes in the three counties than projected, because of the escalating costs of other government services funded by property tax.

Including the sales tax, the burden of the local tax bill increases the per capita local taxes for BART's construction in 1976 to over $29 for the year, compared to a projected cost of $17 from the property tax alone.

B. The Burden and Impact of BART's Financing

This study has evaluated the impacts of BART's capital costs and operating costs. To increase the relevance of these findings for the policymaker, the impacts and burden have been evaluated separately for capital and operating costs.

1. The Burden of Financing BART's Construction

The burden of financing BART's construction can be defined in terms of geographical areas, the dichotomy between households and business, or as the level at which equity is relevant, the household.

a. Geographical Distribution

One of the concerns within the region has been the geographical distribution of financing BART, frequently in terms of the suburban taxpayer versus the urban taxpayer[1]. According to this analysis, Alameda paid 36 percent of the costs financed within the region, Contra Costa 22 percent, and San Francisco 30 percent. Eleven percent of the cost financed by the property tax and sales tax was paid by residents outside the region, through property tax relief reimbursements (which are paid from the State General Fund, or all State taxpayers), or through purchases of goods within the region. But these statistics do not take the full measure of who paid for BART, because they consider only the costs associated with these two bond issues.

When considering all of the sources of funds used to finance BART, only two-thirds of BART's costs were paid by the property tax and sales tax locally. The remaining third was paid by toll bridge revenue (which may also have been paid by the residents of the District counties), and by taxpayers of the federal and State governments, which included many outside of the region. In this broader scope, Alameda paid only 27 percent of the cost of BART, Contra Costa County paid almost 17 percent, and San Francisco paid almost 23 percent. Toll revenues paid partially by residents of the BART counties contributed nearly eight percent of BART's construction cost. One-quarter of the cost was paid by nonresidents of the three BART counties.

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[1] With completion of the Land Use and Urban Development Project, the data to evaluate the allocation of the tax bill between these land uses, over the life of the project, may be possible.

b. Total Burden for Households and Businesses

The distribution of the burden between households and business can also be interpreted in several ways. First, 65 percent of the total burden of BART's capital costs which were financed by property and sales tax will be paid by households. Twenty-four percent will be paid by businesses. The remainder is paid by nonresident households or businesses. Excluding the amount of this tax burden which is exported, nearly 73 percent of the regional cost was paid by the household sector. But the more significant measure remains, what percentage of the total project costs was borne by local households.

The share of the total cost of building BART (including the costs not funded by property or sales tax), which residents of the region paid as consumers of housing or retail goods, was less than half, 48.8 percent. Business paid slightly more than 18 percent. The remainder was paid by residents and businesses from both within the region and outside the region as tolls on the bridges and by State and federal taxpayers. If current federal funding policies had been in effect, the local burden would have been dramatically reduced and the federal share of even a $792 million system would have been at least double the federal government's actual contribution.

The local taxpayer did not pay the majority of the costs of BART. Households in the region did spend over two and one-half times as much for BART as the business sector, despite the rhetoric of justification which acclaimed the effects BART would have on the regional economy and business. In any case, both sectors paid substantially more than would be likely under current federal policies.

c. The Equity of BART's Capital Financing

There are a number of measures of equity which economists apply to tax burden. Frequently cited is vertical equity in terms of ability to pay, with the idea that those with greater ability to pay should pay more. A tax of this nature is considered a progressive tax. A tax which places a heavier burden on those with lower income than on those with higher income is considered regressive.

Another criterion of equity is stated in terms of benefits received. According to this criterion, whoever benefits from a public service should pay in relation to their consumption of that public service.

There are other criteria for evaluating tax burden, including horizontal equity, which means equal taxation for people of equal ability to pay, or neutrality, which means that excess burden is avoided on any given group. To some extent, equity and neutrality are somewhat countervailing.

The financing program for BART's construction and equipment, as well as operations, can be viewed as a two-part pricing scheme. The property and sales taxes represent a price for access to the system, essentially membership dues. Transit fares represent payment for service received.

As a charge for benefits received, BART property taxes should have been levied in proportion to the property value increases generated by the presence of BART, in line with the concepts of value capture mechanisms pursued by UMTA. A uniform property tax across all three counties clearly did not provide this distinction, violating horizontal equity.

If there had been merit in the predictions of rapid transit's influence in stimulating the region through economic development and employment, the financing plan -- with its emphasis on property values and, later, consumer purchases -- might have been appropriate, despite the absense of any relationship to transportation benefits received. But the Economics and Finance Project of the BART Impact Program was unable to identify any economic benefits accruing in the regions from BART other than the impacts of the expenditures on construction, equipment and operations. Hence the financing plan, in retrospect, was regressive in concept as well as execution.

On the other hand, there is a hint of neutrality to this portion of the financing paid by property taxes and sales taxes: everyone pays, regardless of whether they intend to ride BART.

The second element of the financing plan involved payment for service, transit fares. BART's original financing plan reflected greater use of this more equitable source by financing a portion of the capital cost, the rolling equipment, from operating surpluses. In that approach, the riders -- or those who benefit -- would have paid a greater share of the capital cost than the nonrider (and all the operating cost). This source of financing, however, failed to materialize.

Measured against vertical equity, the ability to pay, BART's local financing did not fare well. Capital financing was undertaken with two regressive taxes. The property tax, when it is passed on to renters, affects both the wealthy and lower-income groups in an essential portion of the budget, the cost of shelter. The sales tax is regressive in that it taxes purchases of lower-income groups as much as the purchases of higher-income groups, but consumption represents a larger portion of lower-income budgets.

Identifying different types of representative households, including the poor, retired, middle-income family and the affluent, this project analysis measured the percentage of annual income likely to be spent financing BART. The tax burdens as a percent of income range from 0.24 percent for a family of four at over $45,000 per year, to three times that for a retired individual, over 65, earning less than $5,000 per year (0.72 percent).

Whether the statistics are reviewed in terms of cost relative to household income or per capita income, the wealthy pay a smaller percent. There is no question that the tax burden is regressive, but then so is the financing of most public investment, whether BART, other public transit, or other public works.

The larger question of who benefits and who pays remains elusive, but should represent the substance of the BART Impact Program final report. The Economics and Finance Project has not identified who benefits. But this discussion of equity should not lead to hasty policy conclusions concerning funding transit from the farebox. Transit does represent an essential public service for urbanized land use, with need shared by both residential suburbs and commercial urban cores. One means of improving the equity of transit financing is broadening the tax base to include all users of transportation as well as transit, and sharing the costs of this essential urban service with the nonurban areas which still must depend on the business and commerce of the cities.

2. The Burden of Financing BART Operations

The tax burden of financing BART operations has been evaluated on the basis of a single "typical" year, fiscal year 1976. Unlike the capital cost financing, the No-BART Alternative had both costs and revenues which would have occurred in the absence of BART. The burden of financing BART's operations, then, is the burden of providing regional transit in the three-county District with BART, as opposed to without BART.

a. Geographical Distribution of the Tax Burden

BART's impact on the regional operating deficit represents 60.9 percent of the $46.676 million per year more it costs to provide transit with BART than without BART. Sixty-four percent of this operating deficit is paid by property and sales taxes in the three BART District counties.

The taxpayers of Alameda County paid 22.7 percent of the operating deficit, the taxpayers of Contra Costa, 11.7 percent, and the taxpayers of San Francisco, 17.3 percent. As with the capital costs, Alameda County bears the largest share of the cost, and also has the greatest number of track-miles. Almost six percent of the cost is paid by nonresident businesses or consumers. The remainder is paid by two sources, the taxpayers of San Francisco through reduced services in other programs and the taxpayers of the region through the TDA portion of the sales tax.

The distribution of TDA funds in the absence of BART could have a significant impact on the relative burden borne by each county. If the TDA funds currently allocated to BART were allocated to Alameda and Contra Costa Counties, the property tax burden in those two counties for AC Transit service would be decreased by 19 percent. To be consistent with the NBA definition, it would be appropriate to show that property tax reduction. Pending the outcome of the Public Policy Project, which may reveal service levels would be increased, this additional property tax impact has not been quantified. The burden of BART on taxpayers within the Alameda-Contra Costa Transit District, however, has been the burden of BART's property tax, plus increased property tax for bus service.

b. Total Burden for Households and Business

BART's financing levies a substantial portion of the tax burden on households. Sixty-nine percent of the annual operating deficit funded by the property or sales tax is paid by households, as homeowners, renters or consumers, while only 21 percent is paid by businesses. Because of the small percentage of BART's operating deficit which is funded through federal funds, the portion of the operating deficit which is exported is reasonably small. If federal operating assistance were to become a significant source of financing for BART, the share borne by resident households and businesses would obviously decrease. (AC Transit currently receives almost 50 percent of its operating deficit from nonlocal sources.)

c. The Equity of the Financing of BART's Operations

The same regressive tax sources used for financing BART's capital requirements are used for its operating deficit. Evaluating the impact of BART's financing of its operating costs on typical household types, the regressiveness or inequities become apparent.

The use of sales tax -- which is inherently regressive -- to finance the majority of the operating deficit, however, was not BART's first choice. The sales tax was adopted as a politically expedient solution to a severe funding problem. Originally, it was projected that BART would have operating surpluses, hence the riders of BART would bear the burden for its operating costs. Later, BART would propose vehicle taxes to support its operating deficit, as an equitable means of sharing part of the costs of a transportation system with those who would benefit from decreased congestion. Those taxes failed to gain political support.

The equity of the fare structure and the relative burden it places on different socioeconomic groups is extremely difficult to assess. Insofar as the higher income passengers surveyed tend to pay higher fares, it would appear a progressive fare schedule. The low fares payed by the lower income groups, however, may reflect reduced accessibility to or with BART, rather than progressive fare schedules.

Addressing the equity of BART's financing without considering the equity of the financing mechanisms of other transportation improvements may be unfair. There are similar vertical inequities in highway financing even if highway financing is equitable on a benefits received basis, since highway user fees may also discriminate against lower-income groups, for whom fuel purchases represent a greater percent of income, and who may have a greater likelihood of owning older and less fuel-efficient cars.

APPENDIX A

TAX INCIDENCE CHARACTERISTICS & TAX BASE DATA

APPENDIX A

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I. INTRODUCTION

This Appendix deals with the assumptions and conclusions used in analyzing the direct and final incidence of the burden of financing BART. It presents the justification for assumptions and techniques that were implemented in the tax incidence assessment model and describes the data sources for the analysis.

Sections II through VI describe the characteristics of the financial sources used to finance BART and that by assumption could have been used to finance the No-BART Alternative (NBA). This analysis extends well beyond the actual needs of the BART Impact Program. The financing sources analyzed included all which might conceivably be applied at different rates to fund transportation improvements in the region. Since the NBA financing plan prepared by the Metropolitan Transportation Commission assumes that the only regional taxes which would change are the property tax and sales tax, this analysis may be superfluous for this study. Nonetheless, it provides the basis for testing the incidence of other regional financing plans in the future.

A. Purpose of the Burden Analysis

The purpose of the burden analysis is to identify the burden associated with financing the costs of BART rather than a bus transit improvement. "Burden" is defined as the reduction in real income below the level otherwise prevailing. The analysis is ultimately concerned with the question of how real income reductions are spread among households and other taxpayers. In other words, the task is concerned with identifying those who have paid, and will continue to pay, the cost of BART. The most general definition of the costs of BART or the NBA would include a wide range of effects. The direct capital and operating costs are obvious examples and so are BART-induced street improvements around the stations. Other costs (e.g., costs of elementary and secondary education for the children of construction workers) may also be BART impacts in the sense that they would not have occurred under the NBA scenario.

The very specific cost of BART for purposes of this impact analysis, however, is the difference between the capital and operating costs for regional transit with BART and those costs without BART. The final incidence of BART's tax burden can be influenced also by a wide range of effects. For example, shifts in land use will shift the property tax burden from one jurisdiction to another. Differential rates of growth and development between the BART and the NBA scenarios would have a similar effect.

The fiscal effects of certain of BART's secondary impacts can be analyzed only with great difficulty. As an example, the revenues generated because of secondary employment impacts of BART's construction can be analyzed with reasonable certainty at least in terms of averages but the costs to provide public services during BART's construction period can be estimated only approximately. The budget of this project did not permit a detailed analysis of this and comparable issues and the decision was made by the BART Impact Program (BIP) staff that indirect cost impacts of BART would be considered in the Public Policy Project. Similarly, shifts in the incidence of the direct burden of BART and the NBA because of land use impacts of BART can be determined from the findings of the Land Use and Urban Development Project.

The theoretical framework for the classification of BART's cost by final incidence or burden follows closely that of conventional public finance theory on the incidence and distributional effects of taxation.[1] In this approach, the direct payers of each tax are first identified and then, on the basis of theory or empirical evidence, an assumption is made about how the tax payment may be shifted either forward or backward (i.e., toward the ultimate consumer or toward the producer).

The purposes of this project are not served merely by identifying the final incidence of BART's tax burden. It is also important to classify this analysis in terms that will be meaningful to citizens who will actually be bearing the tax burden. To accomplish this, a series of "typical" households are used to describe the fiscal burden in personal terms.

The typical household groups are used to illustrate the significance of the final incidence of BART's costs, considering the incidence of the taxes compared to household income but also considering the differing circumstances of the different households. One example of differing circumstances involves different consumption patterns as a function of family size. Another comes from the fact that a homeowner's property tax payment is deductible from income subject to federal and California income taxes, while a renter's housing costs are not. This can have the effect of lessening the impact on a homeowner's after-tax real income; and this effect is accentuated by the progressive nature of the income tax where the benefit of deductibility of property tax is more valuable when the income of the household is higher. A similar effect could have existed under an automobile-intensive alternative scenario, because of deductibility of the tax on gasoline.

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[1] For a summary and a discussion of both backward and forward incidence of taxation, see Earl R. Rolph and George F. Break, Public Finance, Ronald Press, New York, N.Y., 1961, pp. 342-347.

A final purpose of the effort is to provide the flexibility to analyze the fiscal impacts of unforeseen events or unforeseen conclusions from other projects in the BART Impact Program. An example of the former would be a revised financing plan for BART's operations, or the operation of another agency, which falls under the Metropolitan Transportation Commission's operational aegis, rather than research. An example of the latter would be a conclusion from the Land Use and Urban Development Project that the incidence of retail sales has shifted because of BART. The tax incidence analysis done during this project was aided by a straightforward mathematical model which can be used either during or after the project to analyze the impacts of unanticipated fiscal events.

B. Emphasis in the Fiscal Impact Analysis

The emphasis given to the various sources of revenue used to finance BART and the NBA depends both on the magnitude of each revenue source and on whether or not the burden of the revenue is truly a BART impact. That is, certain revenue sources were significant to BART but were not BART impacts in the sense that the magnitude of the revenue and the magnitude of the burden would have been the same under both the BART and NBA scenarios. An example is capital grants from the federal government which were significant to BART. There is no reason to assume that federal tax rates would have been lowered (i.e., that the burden of federal taxes would have been different) under the NBA scenario. Accordingly, while federal taxpayers are identified as one group that paid for BART, a detailed analysis of the incidence characteristics of the federal tax system is inappropriate since this revenue source was not a BART impact.

II. INCIDENCE OF THE PROPERTY TAX

A. Property Tax Incidence Theory and Assumptions

The following discussion deals with tax shifting assumptions for each incidence sector, and the theoretical justification for those assumptions. This discussion naturally separates into a number of subsections each of which is concerned with a type of property and the potential use of that property. Assessed value data, as mentioned in Section I, are classified for property types, land, improvements, personal property, and unsecured property. These property types are further subdivided to reflect six potential uses, owner-occupied residential, renter-occupied residential, commercial, industrial, agricultural, and "other" which consists primarily of institutional uses.

1. Incidence of a Tax on Personal Property

For assessment purposes, personal property is tangible property, other than private household property, that is readily relocatable (i.e., not fixed in place, or so cumbersome as to be immobile). For example, furniture located in offices or residential rental property is personal property, as are movable machines or equipment, and inventories. Private household personal property (e.g., furniture) is neither assessed nor taxed. As a result, it can be assumed all taxable personal property is owned by the business sectors.

The largest component of personal property is business inventories Fifty percent of the gross value of business inventories, however, is excluded from the final tax base through the inventory exemption.[1]

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[1] The inventory exemption was 30% in the 1972/73 fiscal year, 43% in 1973/74, and 50% in 1974/75 and thereafter.

In general, the shifting of the tax burden of a tax on a productive asset (e.g., personal property) is dependent upon a complicated interaction involving changes in demand for output of the taxed industry resulting from tax-induced price increases; changes in output of the taxed industry; and changes in the demand for the taxed property.[1] The mobility of personal property could play an important role, especially for inventories which may be (and often are) moved from one tax jurisdiction to another on the jurisdiction's assessment date to avoid taxation. This is unlikely given the small nature of the BART property tax increment. For example, assuming a 65¢ per hundred dollar tax rate, the tax on a $40,000 piece of machinery would amount to only $260 a year. Thus, substitutions of non-taxed inputs for taxed ones is assumed not to take place.

The most important other determinant of tax incidence remaining is changes in output resulting from tax induced price increases. The ability of a firm to pass forward to consumers a tax burden by increasing prices is dependent upon the price elasticity of demand for the firm's output. An elastic demand would inhibit the forward shifting of tax burden since an increase in price would induce a relatively larger decrease in quantity demanded, and thus reduce gross income to the firm. More forward shifting is possible if demand is inelastic because an increase in price causes a relatively smaller decrease in quantity demanded, and thus gross income (i.e., total revenue including consumer paid taxes) is increased.

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[1] Peter M. Mieszkowski, "On the Theory of Tax Incidence," The Journal of Political Economy, Vol. 75, No. 3, June 1967 pp. 250-262.

The scope of the present study does not warrant an industry-by-industry study of demand elasticities (and it is questionable that such a study could produce reasonable results). Certain generalizations, therefore, are made concerning demand elasticity for broad industry groups. The business sector, for purposes of analysis, is divided into two groups with similar tax incidence characteristics: export base and population serving industries.

2. Export Base and Population Serving Industry Personal Property

An industry is defined as export base if sales of its products or services bring income into the region where it is located. Export base industries are often involved in manufacturing or the processing of natural resources. There are many exceptions to this rule. Convalescent homes, for example, may be considered export base if they attract patients from outside their region.

Population serving industries are engaged in providing goods and services primarily for the population living within the region where the business is located. Population serving activities include retail sales, construction, finance, and insurance, among others. Retail outlets serving tourists are considered to be export base.

Assessment records do not indicate the business (export base, or population serving) in which a property is used. Rather, property of all types is broadly divided between commercial and industrial. Typically, industrial property is involved in manufacturing or resource processing industries. Commercial property, on the other hand, is usually in the population serving business sector.

For example, in Contra Costa County, property classified as commercial contains supermarkets, shopping centers, hotels, theatres, restaurants, auto agencies, and financial buildings. Industrial property, on the other hand, contains industrial parks, property associated with research and development and property associated with light as well as heavy industry.

It is assumed for the tax incidence analysis that all industrial property is completely export base, and all commercial property is completely population serving. The division of taxable property between the two industry sectors in any other manner is a complicated procedure involving numerous assumptions.

a. Tax Shifting Assumptions for Personal Property

It has been assumed that all personal property classified as industrial is associated with the export sector. Export base industries, in general, are unable to compensate for increased taxes by increasing the price of their output. Assume that the export market is in equilibrium before the imposition of a property tax increment; then outputs of various competing export industries of different regions are adjusted so the price(s) of each firm's outputs are approximately equal to the price(s) of every other competing firm's outputs (ignoring locational advantages) for comparable products. The imposition of a property tax in one region causes the cost of producing output in that region to increase. This cost cannot be passed on in the form of higher prices since to do so would raise the price above the equilibrium level and result in a competitive disadvantage and a loss of market share.

The absorption of tax burden may present no problem for industries which enjoy excess profits. In more competitive industries, curtailing output and substitution of factor inputs may result. This would produce further backward shifting of the tax burden to the industry sectors which supply the particularly disadvantaged export business.

Although a portion of agricultural output is consumed regionally, agriculture should be classified as an export base industry.

It has been assumed that all personal property classified as commercial is associated with the population serving sector. Taxation of commercial property does not present as much of a burden to the population serving sector as in the case of industrial property taxation. The incidence of property tax levied on commercial property has characteristics similar to those of a sales tax. This similarity results from the process by which property taxes potentially may be passed forward to consumers (i.e., an incremental increase in prices). A degree of shifting of tax burden is dependent upon several characteristics of the products and services which population serving industries produce, and the market in which they are sold. As pointed out earlier, the price elasticity of demand is the fundamental determinant of tax incidence.

A summary of the theoretical factors which determine the elasticity of demand are presented in Section III in the incidence of sales taxation.

Personal property classified as "other property" is primarily institutional and as such is mostly exempted from property taxation. There are small portions of this property, however, that are taxable and are commercial in nature. For example, combination flat-stores (buildings containing residential and commercial use) are included in other property types. Taxed property classified as "other" is assumed to have the same tax burden shifting characteristics as commercial property.

Table II-1 summarizes the tax shifting assumptions for commercial and industrial personal property.

TABLE II-1

ASSUMPTIONS ON THE FINAL INCIDENCE OF BART TAXATION ON PERSONAL PROPERTY

Property Use	Final Incidence Sector	Percent of Tax Burden
Industrial Property	Resident Business	100%
Commercial Property[1]	Resident Business	25
	Resident Consumers	75
Agricultural Property	Resident Business	100
Other Property	Resident Business	25
	Resident Consumers	75

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[1] State assessed personal property is included in the commercial property classification.

Source: McDonald & Grefe, Inc.

3. Incidence of a Tax on Improvements

Improvements are immobile, tangible personal property, such as buildings, machines and equipment which are fixed in place. Computation of tax incidence for taxation of improvements involves a distinction between several types of improvement property. These types include owner-occupied residential, renter-occupied residential, commercial, industrial, agricultural, and other improvements.

a. Residential Property Improvements: Owner-occupied and Renter-occupied

Until recently, economic theory has provided a standard assumption regarding the incidence of taxation on residential property improvements (both owner- and renter-occupied).[1] It was assumed that a property tax on improved residential property would fall on the consumer of that property. The "revisionist" view[2] is that property taxation causes a shifting of investment away from the housing market to more lightly taxed (or untaxed) assets. An increase in demand for other forms of investment induces an increase in the price of those investments, and consequently a lower rate of return. In this manner, some portion of the property tax is shifted to the owners of capital.

Localized changes in property tax rates, however, would not produce the above-described shifting effect. Interest rates (rates of return) are determined in national markets. Since localized changes in property tax rates would not in general affect this national rate, such changes would not produce a shifting of the tax burden to capital owners. In the words of

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[1] Dick Netzer, Economics of the Property Tax, The Brookings Institution, Washington, 1966.

[2] Henry J. Aaron, Who Pays the Property Tax?, The Brookings Institution, Washington 1975.

Dick Netzer (a proponent of the "conventional" theory of incidence), the old view of property tax incidence is ". . . roughly correct for analyzing the distributional effects of changes in property taxes by a given locality, but not in the nation as a whole."[1]

Nevertheless, there are other reasons to believe there is more backward shifting of tax burden than was previously recognized. Recently, more credence has been given to the concept that property tax shifting is a locationally sensitive phenomenon (especially for renter-occupied improvements) subject to housing demand elasticities, and the mobility of housing factors.[2] The shift of housing demand to lower taxed jurisdictions might also be considered an important factor, especially for areas where property tax differentials are distinct. Given this locationally variable criterion, it is important that tax incidence shifting assumptions are sensitive to and in conformance with locational characteristics.

i. Tax Shifting Assumptions for Owner-Occupied Residential Improvements

The owner-occupant of residential property is in the unique position of being both the supplier and consumer of his property. The only remaining group to which any portion of tax burden may be shifted is the builder of housing.

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[1] Dick Netzer, "The Incidence of the Property Tax Revisited," The National Tax Journal, Vol. XXVI, No. 4, Dec. 1973, p. 525.

[2] David R. Meinster, "Property Tax Shifting Assumptions Effects on Incidence Profiles," Quarterly Review of Economics and Business, Vol. 10, Winter, 1970, P. 68.

Generally accepted estimates of the price elasticity of demand for housing are in the -1.0 range.[1] Under this condition, it is to be expected that in the long run the major portion of the property tax on structures will be borne by consumers.[2] In the short and intermediate time reference, the supply of housing is fixed and the burden of taxation will fall on the owner of the asset, who is no other than the consumer. All of these factors lead to the inevitable conclusion that an overwhelming portion of the property tax on owner-occupied improvements is borne by the owner-occupant himself.

The BART counties have continually exhibited very inelastic demand for housing, evidenced by lower than average vacancy rates. Postal vacancy surveys of the BART counties indicate the following vacancy rates.

TABLE II-2

BART COUNTIES VACANCY RATES
(COMBINED OWNER AND RENTER OCCUPIED DWELLINGS)

			Year[3]		
County	1970	1972	1973	1974	1975
Alameda	1.7%	2.6%	2.3%	2.4%	2.3%
Contra Costa	1.7%	2.4%	3.0%	3.4%	2.0%
San Francisco	0.6%	1.6%	1.2%	1.7%	1.4%

Source: U.S. Department of Housing and Urban Development, Postal Vacancy Survey-San Francisco-Oakland, California, annual publication.

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[1] Netzer, op. at., p. 525.

[2] Ibid.

[3] Surveys were done for a seven-day period in June or July of the indicated year.

The 1970 Census of Housing shows an overall California vacancy rate of 3.4% in the census year. This indicates that the BART counties all had unusually low vacancy rates. This was true for rented as well as owner occupied dwellings. Although census data on more recent statewide vacancy rates are not available, it may be inferred from the data of Table II-2 that the low vacancy rate pattern has continued.

It is assumed that there is very little backward shifting of tax burden, the burden of taxation falling almost completely on the owner-occupant.

Some housing supply factor immobility is presumed for this tax shifting assumption, thus a small backward shifting to the business sector is appropriate. Assumptions on tax burden shifting for owner-occupied dwellings are presented in Table II-3.

TABLE II-3

ALTERNATIVE ASSUMPTIONS ON THE SHIFTING OF THE TAX BURDEN FOR OWNER-OCCUPIED RESIDENTIAL IMPROVEMENTS

Final Incidence Sector	Percent of Tax Burden
Homeowners	95%
Business (Housing Supply Factors)	5%

Source: McDonald & Grefe, Inc.

ii. Assumptions on Shifting of Tax Burden for Renter-Occupied Residential Improvements

With one modification, the incidence characteristics of a tax on renter-occupied residential improvements are exactly analogous to those of a tax on owner-occupied residential improvements. The main difference is, of course, that the consumer is not also the owner. Therefore, there is a greater possibility for forward shifting of the tax burden.

In the short run, a supply of housing is totally inelastic (i.e., the number of existing units cannot be changed[1]). The inability of owners to adjust the supply of rental housing in the short run causes the entire burden of taxation to temporarily rest with the owner. In the longer run (deLeeuw and Ekanem estimate six years), the supply of housing can be adjusted to the point where the entire burden of the increase in taxation can be shifted to the renter. Since the initial year of the tax incidence study is more than six years after the initiation of the property tax it can be assumed that the market has reached an equilibrium whereby some portion of the property tax is shifted forward to renters.

In conclusion, the assumption can be drawn that in the long run there is essentially no difference between tax incidence for renters and owner-occupants, especially for small incremental increases in local property taxation. Both receive their share of the tax burden as consumers, not owners of housing. Only small backward shifts of tax burden to housing supply factors are possible.

Tax burden assumptions for renter-occupied residential improvements are presented in Table II-4.

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[1] See Frank deLeeuw and Nkanta F. Ekanem of the Urban Institute, "The Supply of Rental Housing," American Economic Review, Vol. 61, December 1971, pp. 806-817.

TABLE II-4

ASSUMPTIONS ON SHIFTING OF BURDEN FOR TAXATION OF RENTER-OCCUPIED RESIDENTIAL IMPROVEMENTS

Final Incidence Sector	Percent of Tax Burden
Renter	95%
Business	5%

Source: McDonald & Grefe, Inc.

b. Taxation of Agricultural Improvements

The incidence of a tax on agricultural improvements is entirely borne by the owner of those improvements. Several factors cause this, including the high degree of inelasticity of supply for farm products, the position of farming as an export base industry, and the relative immobility of farmers.

Higher taxes are reflected in lower net returns from agricultural property. The adverse impacts of higher tax rates on investment and output in agriculture, however, are limited by the relative immobility of farmers. Instead of moving to a lower taxed region, the farmer is likely to capitalize his loss in income, thus lowering the value of farm property, and offsetting the reduction in income.[1] Lowered farm income will produce effects in other sectors. Businesses supplying the needs of farms will experience a reduction of income.

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[1] Dick Netzer, Economics of the Property Tax, The Brookings Institution, January 1966, pp. 110-111.

In general then, no shifting of the tax burden to consumers of agricultural products will take place, but some shifting to business sectors serving the agricultural industry is expected. This does not constitute a shifting of the tax burden between the economic sectors used in this analysis because both agricultural and those industries which serve agriculture are included in the incidence sector labeled business.

The assumption on the shifting of tax burden for agricultural improvements is presented in Table II-5.

TABLE II-5

ASSUMPTIONS ON THE SHIFTING OF BURDEN FOR TAXATION OF IMPROVEMENTS

Property	Initial Incidence Sector	% of Tax Burden
Owner-Occupied Residential	Homeowner	95%
	Business	5
Renter-Occupied	Renter	95
	Business	5
Commercial	Business	25
	Consumer	75
Industrial	Business	100
Agricultural	Business	100
Other	Business	25
	Consumer	75

Source: McDonald & Grefe, Inc.

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c. Taxation of Commercial Improvements

Commercial improvements essentially have the same tax incidence characteristics as commercial personal property. Commercial property is usually associated with population serving services. In general, they are able to pass forward the burden of taxation. The shifting assumptions used here (Table II-5) were first formulated by Netzer for his incidence study of 1966.[1]

d. Taxation of Industrial Improvements

Industrial improvements are assumed to have the same tax incidence as industrial personal property. Since industrial property is associated with export base industries, a major portion of the tax burden must be borne by the owner of the improvements. The tax shifting assumptions for industrial improvements are presented in Table II-5.

e. Taxation of Improvements Associated with Property Classified as "Other"

Property classified as "other" is primarily institutional or population serving in nature. The tax burden assumptions for this class of property are assumed equivalent to those for commercial property. State assessed improvement property is included in the commercial property classification.

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[1] Dick Netzer, Economics of the Property Tax, The Brookings Institution, January 1966, p. 259.

4. Incidence of a Tax on Land

A large body of tax incidence theory (as well as the so called "new view"[1]) regards the supply of land as totally fixed and thus the elasticity of the supply as entirely inelastic.[2] Under these conditions, any increase in the price of land induced through the imposition of a tax would be absorbed by the owner of the land, regardless of the land use. In the present analysis, however, we depart from these arguments. Rather, we will adopt Vilfredo Pareto's concept of economic rent which he defines as the excess earnings over the amount necessary to keep a factor in its present occupation.[3] Using this definition of rent, it becomes apparent that the supply of land cannot be regarded as totally inelastic. As rents for a particular use become greater, more land is diverted from alternative uses, and the quantity supplied is increased. This more elastic supply allows for some forward shifting of tax burden.

In addition, it may be argued from a behavioral view that property taxes on land are regarded by certain land owners as a business cost and therefore shifted forward to consumers to the greatest degree the market will allow. In some cases this forward shifting is automatic. For example, frequently commercial rental leases will contain clauses which automatically raise (or lower) rents according to property tax changes.

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[1] Henry J. Aaron, Who Pays the Property Tax?, The Brookings Institution, May 1975, p. 20.

[2] In the Bay Area, the supply of land may actually be increased through infill of the Bay itself. This small change in supply, however, is not considered to have enough significance to affect general market equilibrium.

[3] Robert H. Wessel, "A Note on Economic Rent," American Economic Review, Vol. LVII, No. 5, December 1967, pp. 1121-1226.

Taxes imposed upon owners of industrial and commercial property, both renter- and owner-occupied, and those imposed upon the owners of residential rental property, may be passed forward to consumers. For residential owner-occupied land the owner of the property will bear the burden of taxation as there is no one to whom the burden can be shifted.

The market forces which determine the ability of business to pass forward the burden of land taxation are determined by the market for the good which the business produces or distributes. These forces are the same as those which determine the shifting of burden for the taxation of other forms of property. Incidence characteristics may therefore be assumed to be a function of property use, as outlined in the section on taxation of personal property. The assumptions of burden shifting for improvements taxation, presented in Table II-5, are identical to those for the taxation of land.

5. Incidence of a Tax on Unsecured Property

a. Definition of Unsecured Property

Unsecured property is any taxable property for which foreclosure for nonpayment of taxes is difficult or impossible.[1] Personal property is usually the largest component of unsecured property. It commonly takes the form of inventories located in renter-occupied commercial or industrial buildings. A building would be considered an unsecured improvement if the building and the lot upon which it sits were owned by different parties. Possessory interests (i.e., leasehold interests) in land are considered for taxation purposes to be unsecured land.

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[1] Section 109 of California Property Tax Law states " . . . (secured) property . . . is property the taxes on which are a lien on real property sufficient, in the opinion of the assessor to secure payment of the taxes." Unsecured property is any property that is not secured. Source: Commerce Clearing House, State Tax Reporter - California, (continuously updated), Vol. 2, p. 3128.

b. Final Incidence of a Tax on Unsecured Property

The characteristics that determine the final incidence of taxation (assuming the tax is paid) are influenced by aspects of the market for the taxed property, not its legal standing for assessment purposes. Unsecured property has been included as a separate entity only because of assessor record-keeping practices. Unsecured land, improvements and personal property are treated the same as secured property of the same use. In most cases, unsecured property is associated with commercial and industrial uses.

B. Time Reference of the Property Tax Analysis

Tax base data are available for fiscal years 1971-72 through 1975-76. This time period was chosen on the basis of two criteria. First, the relevance of the time period in generating data germane to the overall analysis of tax incidence. Second, the availability of data.

Inquiries made of the Assessors' Office of Alameda, Contra Costa and San Francisco counties reveal that annual data on assessed valuations classified by land use code are available for all three counties only for the years 1971-72 through 1975-76. Given this constraint, an examination was done of the costs and benefits of generating data for previous years by sampling the tax rolls of the three counties; and it was decided to proceed with the tax incidence analysis using only the 1971-72 through 1975-76 data.

The decision to proceed with available data was based on consideration of the nature of the tax incidence analysis, the purpose of which is to pinpoint the distribution of the BART-related tax burden. BART's property tax burden is almost entirely a function of the debt service requirements on the general obligation bonds issued to finance the system. Of the BART revenues generated by the property tax, approximately 95% are allocated to debt service. Thus, if BART general obligation bond debt service requirements prior to 1971-72 were negligible in the context of overall BART debt service, there would be little justification for an extended effort to acquire property tax data for the early years.

As is shown in Figure II-6, BART debt service requirements prior to 1971 were in fact a relatively insignificant percentage of the overall debt service. Figure II-6 shows that in the period for which data are not available, only 10% of the BART debt was serviced.

A projection of tax incidence is germane to the analysis as debt service of presently existing bond issues continues through the year 1999. Demographic and/or land use changes could occur over this period which significantly influence the distribution of tax burden among economic sectors. Horizon years for tax burden projection are 1980, 1990, and 2000.[1]

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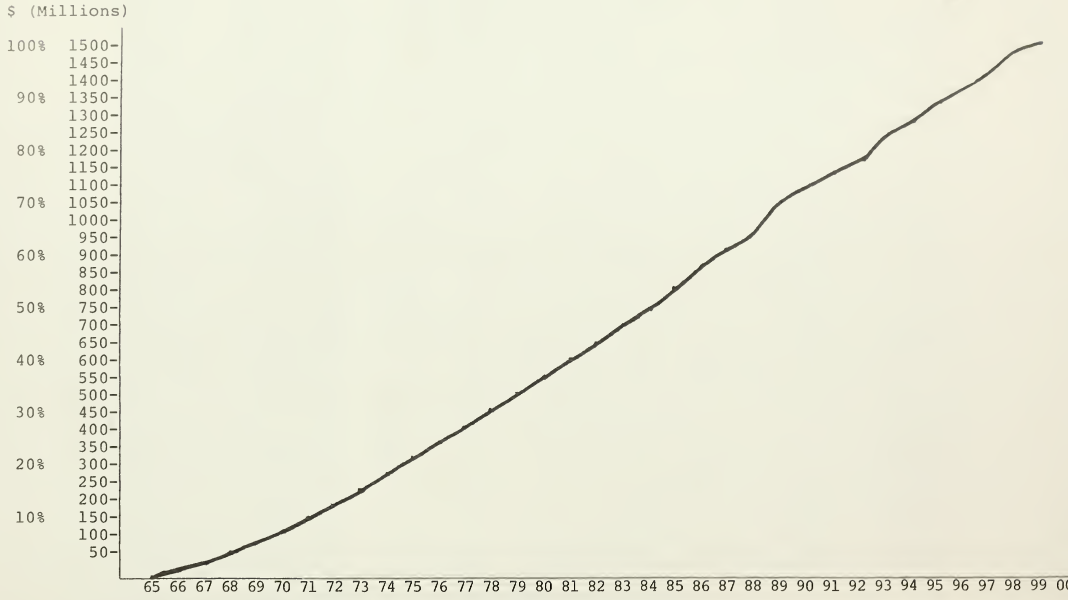
[1] Even though debt service is presently scheduled to terminate in 1999, for the purposes of analysis it will be assumed to continue through the year 2000.

FIGURE II-6

CUMULATIVE DEBT SERVICE
BART GENERAL OBLIGATION BONDS



For purposes of projecting the incidence of the property tax, as an interim measure, land use proportions of the BART District are assumed to remain constant through 2000. The BART Impact Program preferred using the Land Use and Urban Development Project projections to other available sources.[1]

C. Tax Base Data

The analysis of tax incidence requires a classification of assessed value for different types of property in the various property uses. Property type and use divisions are selected on the basis of the specific criteria of data availability and relevance to quantitative analysis of direct tax incidence and subsequent shifting characteristics. Assessor records provide classification of property by three types. In addition, there are three property tax exemptions. These are subdivided to reflect the uses of each property and exemption. This data breakdown is sufficient for a thorough quantitative analysis of tax incidence.

The cross-section of assessed value data is not readily available for any level of geographic disaggregation smaller than a county.

Property tax rates for both BART and NBA for each county are also required in the analysis. Historical rates are summarized in Table II-7.

Unfortunately, data are not readily available from all the various county assessor's records in the format needed for this analysis. For some classifications of property type, and for certain uses, assessed valuations must be derived from related data that are available. Table II-8 summarizes the data presently available for each county. The data of Table II-8 however, do not exist for each year of the historical study period, a problem which is treated in this section. Several other problems exist with these primary data. The methods of generating the complete data base from the available data are also described in this section.

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[1] The methodology could be implemented after completion of this project and, in fact, would be appropriate for evaluating future alternative financing plans of an even more comprehensive nature.

TABLE II-7

BART PROPERTY TAX RATES
(Cents Per $100 Assessed Value)

Fiscal Year	Alameda County	Contra Costa County	San Francisco County	Berkeley (City)
1971-72	62.5	65.7	70.4	87.9
1972-73	58.7	61.4	65.1	83.8
1973-74	53.6	58.7	60.9	76.3
1974-75	54.0	51.2	56.1	76.2
1975-76	47.1	44.7	49.9	66.3

Source: BART Annual Reports

Alameda-Contra Costa Transit District (AC Transit)
(Tax not levied in all taxation districts)

Fiscal Year	Contra Costa County	Alameda County
1971-72	32.4	30.8
1972-73	32.2	30.9
1973-74	33.6	30.6
1974-75	51.3	54.1
1975-76	45.3	47.7

Source: Contra Costa County Auditor's Office and Alameda County Auditor's Office

TABLE II-8

ASSESSOR RECORD PRIMARY DATA

		SECURED PROPERTY						
		Land	Imps	Pers Prop	Inv Ex	HH Ex	Reg Ex	Total
LAND USE	1	▨	▨	▨	▨	▨	▨	▨
	2	▨	▨	▨	▨	▨	▨	▨
	3	▨	▨	▨	▨	▨	▨	▨
	4	▨	▨	▨	▨	▨	▨	▨
	5	▨	▨	▨	▨	▨	▨	▨
	6	▨	▨	▨	▨	▨	▨	▨
Total		▨	▨	▨	▨	▨	▨	▨

		UNSECURED PROPERTY						
		Land	Imps	Pers Prop	Exemp	Inv Ex	HH Ex	Total
LAND USE	1							
	2							
	3							
	4							
	5							
	6							
Total		▨	▨	▨	▨	▨	▨	▨

		STATE ASSESSED PROPERTY (UTILITIES)				GRAND TOTAL PROPERTY
		Land	Imps	Pers Prop	Total	
LAND USE	1					
	2					
	3					
	4					
	5					
	6					
Total		▨	▨	▨	▨	▨

KEY:

Land - Land
Imps - Improvements
Inv Ex - Business Inventory Exemption
HH Ex - Household Exemption (Homeowner's Exemption)
Reg Ex - Regular Exemption
Pers Prop - Personal Property (Sum of household and business personal property)

▨ Presently Available Data

Land Uses:

1 - Residential Owner-Occupied
2 - Residential Renter-Occupied
3 - Commercial
4 - Industrial
5 - Agricultural/Rural
6 - Other

Source: McDonald & Grefe, Inc.

1. Classification of Residential Property as Owner- or Renter-Occupied

An important question relevant to the incidence of BART's tax burden is whether renter households or non-renter households pay a greater percentage of BART's property tax costs. In order to answer this question, the property tax base associated with each of these groups must be found.

Assessor's files indicate the value on a parcel-by-parcel basis of the residential units which are owner- and renter-occupied. Unfortunately, this information is not available in aggregated form. The cost of generating this information directly from assessor's files was prohibitive. An alternate method of making the division between the value of owner- and renter-occupied units was utilized.

The assessed values of single-family and multi-family dwellings are available in aggregated form. An estimate of the assessed value of owner-occupied dwellings may be computed on the basis of this data. The mean assessed value of owner-occupied single-family dwellings (i.e., one unattached dwelling on a single lot) multiplied by the number of home-owner tax exemptions associated with single-family dwellings[1] is equal to the total assessed value of owner-occupied single-family units. A similar procedure may be used for multi-family dwellings (i.e., attached housing units). The sum of the values is the total assessed value of owner-occupied improvements (dwellings). This value, when subtracted from the total assessed value of residential improvements as provided by assessor files, gives the assessed value of renter- and owner-occupied units. It should be noted that this procedure implies that owner-occupied dwellings have the same mean value as renter-occupied dwellings.

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[1] Information on the breakdown of home-owner exemptions between single-family and multi-family units is published by the U.S. Department of Commerce, Bureau of the Census, Detailed Housing Characteristics, August 1972, Table 43, p. 250.

2. Deriving Annual Tax Data

For some years of the tax incidence study period (including future years), a complete cross section of information on assessed value by property type and use is not available. Nonetheless, there are available for these base years (and projected for future years) total value figures for the various property types and uses.

Net assessed values by use and type for years with incomplete data can be generated using the cross-sectional data (i.e., value by use and type) from a known year in conjunction with total assessed values by use and values by type. The process by which the values by use and type may be expanded into a complete table of assessed value by use and type is known as iterative scaling. In short, the method entails a repetitive normalization of the columns and rows of the table from a known year (called the target matrix) to control totals which are the sums of rows and columns of the incomplete table. Normalization involves multiplication of each element in a row of a table from a year with a complete table by a coefficient so that the sum of the elements in the row are equal to the known sum of the row for the year with incomplete data. This process is done to each row of the table, and then to each column. After the columns are completed, the sums of the rows in the table will need further adjustment. The process is repeated on rows and columns until the sums of the rows and columns become arbitrarily close to the desired or known amounts. In this manner, a complete table for a year with incomplete, disaggregated data can be generated from knowledge of the sums of the rows and columns for that year.

The tax base structure (relative distribution among tax base elements) which this method produces will not be radically different from that of the year from which the target matrix is drawn. The procedure allows for changes in absolute magnitude of elements of the tax base. In addition, some relative shifting among the elements is possible.

3. Allocation of Unsecured Property to Land Use Characteristics

Although the assessed value of unsecured property is identified by property type in the assessment records of each of the BART counties, in none of the counties is the land use for any type of unsecured property available. Since the tax incidence analysis requires valuation of property by land use classification as well as property type, it is necessary to allocate unsecured property to land use classifications.

Interviews with personnel from each of the BART counties who are familiar with unsecured tax rolls have provided a basis for a judgmental estimate of the distribution for unsecured property among property uses. The distributions are presented in Table II-10.

The assessed value of unsecured property for each property type will be distributed to use categories on the basis of the estimated distribution.

The assessed value of unsecured property ranges from 6% to 10% of the total tax base (see Table II-11), depending upon the BART county in question. Given this small amount, the distribution of unsecured property to use categories on the basis of figures in Table II-10 is sufficiently accurate to avoid a distortion of the computed tax burden distribution.

TABLE II-10

ESTIMATE OF THE DISTRIBUTION OF UNSECURED PROPERTY AMONG PROPERTY USES

In Alameda, Contra Costa and San Francisco Counties

Residential	1%
Commercial	60%
Industrial	35%
Agricultural[1]	1%
Other	3%
	100%

Source: McDonald & Grefe, Inc.

[1] There is no agricultural property in San Francisco County. "Other" property is assumed to be 4% of unsecured property in San Francisco County.

TABLE II-11

VALUE OF UNSECURED PROPERTY AS A PERCENTAGE OF TOTAL ASSESSED VALUE

1975-76	Unsecured ($1000)	Total ($1000)	Percent
Alameda	499,005	5,014,007	9.95%
Contra Costa	194,604	3,270,196	5.95%
San Francisco	338,481	3,908,192	8.66%

Source: McDonald & Grefe, Inc.

4. Special Problems with San Francisco Data

The data breakdown illustrated by Table II-12 could be obtained for San Francisco County only with a substantial and costly data processing which was beyond the scope of this project.

Readily accessible data include only total assessed values by property type and by property use. An indirect source of data, however, has been obtained.

A survey of 373 parcels in San Francisco County was conducted by the California State Board of Equalization, Research, Statistical and Consulting Division for the 1974-75 fiscal year. From this sample the Board extrapolated the distribution of assessed value by property type and use.[1] It should be understood that such a small sample undoubtedly introduces certain inaccuracies into the tax burden analysis for San Francisco. Nonetheless, this distribution of assessed value represents the best source available given time and budget constraints of this study.

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[1] The California State Board of Equalization, Research, Statistical and Consulting Division sampled a total of 373 parcels from a population of 182,376 which represented the entire population of secured and unsecured parcels in San Francisco. State assessed property was excluded from the sample. A stratified random sampling technique was used. This entailed the division of parcels into value groups. Parcels with higher values were weighted more heavily (i.e., sampled more frequently). Parcels within value groups were sampled at random. The total assessed value figure for secured and unsecured property extrapolated from the sample has confidence limits of ±1.7% at a 5% level of significance. Confidence limits for each classification of property were not computed.

The total San Francisco County assessed value distribution by property type and use extrapolated from the survey results (i.e., the population) is presented in Table II-12. Assessed values in the table represent the sum of secured and unsecured property. Exemptions have been netted out.

TABLE II-12

TOTAL SAN FRANCISCO ASSESSED VALUES OF
SECURED AND UNSECURED STATE ASSESSED PROPERTY 1974/75

($1000)

Sample Size 373 Parcels

	Land	Improvement	Personal Property	Total	Percent
Single-Family Dwellings	$262,599	$ 333,722	NA[1]	$ 596,321	23.4%
Multi-Family Dwellings	217,335	438,121	$ 4,668	660,124	25.9
Commercial	280,956	605,116	219,085	1,105,157	43.3
Industrial	51,012	71,761	57,154	179,927	7.0
Other	9,869	NA[1]	2,182	12,051	0.5
Total	$821,771	$1,448,720	$283,089	$2,553,580	100.0%
Per cent	32.2	56.7	11.1	100	

Source: California State Board of Equalization, Research, Statistical and Consulting Division (Sacramento, undated)

[1] Sample too small to draw conclusions

5. Special Problems with Alameda and Contra Costa Counties' Data

Assessed value data by property type and use are available on a county-wide basis for both Alameda and Contra Costa counties. The tax base for the Alameda-Contra Costa Transit (AC Transit) District, however, does not encompass the entire two counties. In order to adequately measure the tax burden of the property tax levied for the transportation district, it is necessary to have assessed values by property type and use for just those taxation districts which are included in the transit district.

Assume that the tax base for areas in Alameda County which are not taxed for AC Transit has a distribution of tax base elements identical to the county as a whole.[1] Elements of the county-wide assessed value table (Table II-11) are therefore reduced in a proportional manner to reflect the total assessed value that exists only in the AC Transit District.

In Contra Costa County, the problem is somewhat more complicated than for Alameda County. Most of Contra Costa County is not within the AC Transit taxation zone.[2] Only the most westerly portions of the county are included. Western Contra Costa County within the AC Transit District is almost entirely urbanized. Therefore, the assessed value table used as input to the property tax section of the incidence model will be adjusted to exclude agricultural land. The remaining non-zero elements of the table will be proportionally reduced so the sum of the assessed value elements equals the total assessed value within the AC Transit District.

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[1] Areas in Alameda County which are not taxed for AC Transit are Livermore, Pleasanton, Union City and Dublin. Newark and Fremont were not taxed until the 1975-76 fiscal year. This simplifying assumption is necessary in order to avoid methodological emphasis on less significant elements of the tax incidence assessment study.

[2] The AC Transit District in Contra Costa County includes El Cerrito, Richmond, San Pablo, portions of Pinole, and most of the unincorporated area in the Richmond School District. Many urban areas are not served.

a. Computation of Property Tax Incidence

Computation of tax burden for each incidence sector is relatively straightforward. The total burden of taxation equals the sum of the values of secured and unsecured property with the same use, less exemption values, multiplied by the appropriate tax rate. The resultant tax burden amount is then allocated to the various incidence sectors as the shifting assumptions dictate.

Before computation of tax incidence, exemptions must be allocated to property types. This is done because tax burden is a function of the property holdings of a particular incidence group, and there are different tax shifting characteristics for each property type. There are three types of property tax exemptions which must be considered: households (homeowners), business inventory, and "regular". The homeowners' exemption applies to both land and improvements on owner-occupied residential property. For purposes of computation it may be subtracted from the assessed value of either land or personal property. Business inventory exemptions apply only to business personal property. A regular exemption is a constitutionally mandated property tax exemption for certain institutions (e.g., schools, hospitals, and non-profit organizations). Unlike business exemptions, this exemption may be applied against the assessed value of land as well as personal and improved property. The value of the regular exemption is available by property use for every county in the BART area. Unfortunately, there is no indication what portion of the regular exemption is for land, and what portion applies to personal and improvement property. The tax incidence analysis requires that this division be made specific.

The value of the regular exemption by property use is allocated between land and the other property types in a manner proportional to the percent distribution of the assessed value of the property types. For example, if 40% of the assessed value of other property is attributable to land, a corresponding 40% of the regular exemption on other property is applied against the land value. The remaining 60% of the regular exemption is applied to improvements and personal property.

III. INCIDENCE OF SALES AND USE TAXES

An analysis of sales and use taxes was conducted in order to determine the ultimate incidence of burden between business and consumer and the total magnitude of sales and use taxation. Both the sales and use taxes[1] are imposed upon the sale price of tangible personal property at the time of final sale. A sales tax is levied upon the seller (retailer), although the seller may immediately pass the tax the buyer. A use tax is collected from the buyer and is most frequently used in situations where it is impractical to collect from the seller (e.g., when one private citizen sells an automobile to another).

The analysis of tax burden was conducted in two stages. First, the direct sales tax burden, by economic sector, was established. This direct burden is a result of direct purchases by economic sectors. A second stage of analysis considered burden shifting. Here, the final incidence of sales tax is dependent upon the degree to which the burden is shifted, either forward toward consumers, or backward to the producers and distributors of taxable goods. This shifting of burden is a function of the elasticities of demand and supply for the commodity being taxed.

There are two sales taxes used to support public transportation. BART is partially financed by a special 0.5 percent sales tax on taxable transactions executed within any of the three BART counties. Excluded from the sales tax base are purchases made by non-residents of the BART area who take delivery of their purchases outside the BART sales tax jurisdiction. Because of these exclusions, the BART sales tax base is of somewhat lesser magnitude than the general sales tax base. Funds generated by the BART sales tax are used in support of BART. They are not used to finance any other form of public transportation.

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[1] As a convention, and to improve readability, the sales and use tax combination will be referred to as simply "the sales tax."

Another source of income supporting public transportation was established by the Transportation Development Act (TDA) of 1971 (also known as the Mills-Alquist-Deddeh Act or Senate Bill 325). The Act did not increase the overall sales tax rate, but created a fund consisting of the revenues raised by one-quarter cent of the existing sales tax (i.e., a tax rate of 0.25 percent), and earmarked it for public transportation. These TDA funds are not included in this analysis of sales and use tax burden since the TDA funds may be used for any form of public transportation, or for road construction if all other public transportation needs have been met previously.

A. Direct Sales Tax Burden by Economic Sector

Economic sectors germane to the estimation of tax burden are households residing within the BART area, producers and distributors located in the BART area, government agencies within the BART jurisdiction, and all non-residents of the BART area (i.e., businesses and residents who purchase goods within the BART District).

The first step in computing sales tax burden was to derive total sales tax collections for BART in the three-county BART District. The tax base for the BART 0.5 percent sales tax is, of course, taxable transactions. The BART sales tax base is of lesser magnitude than the general sales tax base in the BART counties. The difference is due to the fact that the BART tax is not levied on final sales made to non-residents of the BART tax jurisdiction who take the delivery of their purchases outside the tax jurisdiction. Data on BART sales tax collections by county are not available. However, the California State Board of Equalization publishes quarterly reports on taxable retail sales by county. Collections by county were derived by distributing the total BART District collection to the counties of the district in proportion to the general sales tax base.

The California State Board of Equalization does not provide information concerning taxable purchases made by members of the tax base (e.g., residents compared to businesses compared to tourists). Rather, reports published by the Board indicate sales by retail store category, certain sales made by firms engaged in business and personal services, and sales for all other outlets. Analysis of the retail sales tax base required information regarding purchases rather than sales. For example, it was necessary to estimate taxable purchases by the manufacturing sectors as compared to the household sectors in order to analyze final incidence.

Estimation of the direct incidence of the sales tax required the allocation of sales tax payments among consuming sectors with differing incidence characteristics. Taxable purchases by economic sectors were estimated through the use of the Bay Area input-output model.[1]

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[1] The Bay Area input-output model is contained in McDonald & Grefe, Inc., "The Economic Impacts of BART Capital and Operating Expenditures," a Technical Memorandum prepared for the Metropolitan Transportation Commission, October 1977.

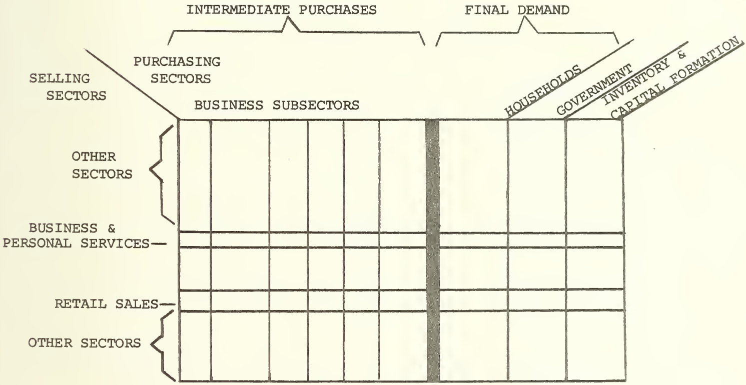
The rows of the input-output matrix indicate the value added on sales (see Figure III-1). The retail sales row includes the overwhelming majority of taxable sales, in addition to the non-taxable retail sale of food for home consumption. A small portion of taxable sales are included in the business and personal services row. The greater portion of sales expressed within this row, however, are not taxable under a sales tax. Therefore, the sales in the business and personal services row were not included.

The frequency distribution (i.e., percent distribution) of the margins for a selling sector is used to distribute total taxable sales made by that sector to the various purchasing sectors indicated in the columns of the input-output matrix. Taxable retail sales were allocated to business or households in a manner directly proportional to the percent distribution of the value added figures indicated in the selling sector row. It is assumed that the value added figures expressed in the input-output matrix are a constant multiple of the total dollar amount of sales made to each purchasing sector. Unfortunately, this relationship only holds if gross profit margins (i.e., percent value added) among firms engaged in different areas of retail trade are equal. Therefore, the division of tax burden between the business and household sectors are only approximations of the actual tax incidence.

Purchases made at retail by federal government agencies are not taxable under the sales tax. State and local governments, however, are required to pay sales tax. The burden of this taxation may be assumed to be shifted backward to the sources of revenue from which state and local governments derive their income. These sources include the property tax, sales

FIGURE III-1

BAY AREA INPUT-OUTPUT DOLLAR FLOW MATRIX



Source: McDonald & Grefe, Inc.

tax, and state income tax. The business and household sectors pay the majority of these taxes.

The sales tax burden generated by these purchases is shifted backward to the business and household sectors in amounts directly proportional to their financial contributions to local government. At the federal level, approximately 48% of state and local revenues are generated through taxation of the business sector. The remaining 52% is attributable to the household sector.[1] However, the retail sales tax burden of the government sector was not estimated because government is a net provider of retail services to the private sector within the input-output model accounting framework.

Some portion of the sales tax burden is exported from the BART District to the constituents of other counties of the Bay Area as well as the nation at large. Sales tax burden is exported whenever a non-resident of the three counties makes a retail purchase within the BART District and takes delivery of that purchase within the area. Inter-regional flows of retail sales, and thus sales made within the BART District to non-residents of the BART area will be found as part of the Land Use and Urban Development Project. Until such time as those estimates of the inter-regional retail sales are available, it is assumed that 10 percent of retail sales made within the BART area are to non-residents of the BART District, based on Visitors' Bureau statistics.

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[1] These figures were found by averaging the division in tax receipts between those attributable to the business and household sectors. The source of data was the Survey of Current Business which publishes tables indicating all personal tax and non-tax receipts, corporate profit taxes and indirect business taxes collected by all state and local governments. All personal tax and non-tax receipts were assumed attributable to the household sector. All corporate profits tax and indirect business tax were assumed generated by the business sector. These assumptions are not entirely satisfactory since components of the above national accounts do not adequately coincide with the household and business sectors, respectively. Further research is being done to resolve this question. Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, Vol. 56, No. 6, June 1976, Table 17.

The Bay Area input-output model revealed a pattern of 12 percent of non-export retail sales being made to business. Thus, the direct incidence of BART sales tax burden is 10.8 percent borne by business, 79.2 percent being borne by household members, and 10 percent being borne by the export sector.

B. Burden Shifting Assumptions

Taxable transactions represent final sales of tangible personal property. Some of these purchases are made by businesses. The sales tax on these transactions may or may not be passed forward to final consuming households or other businesses. It is assumed that the burden of taxation associated with the sales of convenience goods is passed forward completely to the consumers of these products. Businesses distributing convenience goods are defined as indicated in the Census of Retail Trade.[1] Convenience goods are sold by the following outlets: food stores, eating and drinking places, and drug stores (see Table III-2).

A complete shifting of tax burden is not possible for shopping goods, thus a partial shift of the burden is assumed

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[1] U.S. Department of Commerce, Bureau of the Census, 1972 Census of Retail Trade, Washington, D.C., April 1975.

TABLE III-2

CLASSIFICATION OF RETAIL ITEMS

PRODUCT TYPE	STATE BOARD OF EQUALIZATION "TYPE OF BUSINESS" OUTLET
Convenience Goods	Drug Stores Eating and Drinking Group (include Food Stores)
Shopping Goods	Apparel Stores Group Department and Dry Goods Gifts, Art Goods and Novelties Photo Equipment and Supplies Musical Instruments Stationery and Books Jewelry Household and Home Furnishings Household Appliances Dealers Second-Hand Merchandise
Other Goods	Limited-Price Variety Other General Merchandise Florists Office, Store and School Supplies Other Specialties Farm Implement Dealers Farm and Garden Supply Stores Fuel and Ice Dealers Building Materials Group Automotive Group Business and Personal Services All Other Outlets

Source: McDonald & Grefe, Inc.

(see Table III-2). Shopping goods outlets are defined by the Bureau of Census[1] as general merchandise stores (e.g., department stores), apparel stores, furniture and appliance stores, and service outlets for insurance, auto repair, real estate, amusement, etc. (see Table III-2).

Remaining types of retail outlets are not classified by the Bureau of Census as convenience or shopping goods specialty stores. In addition, California State Board of Equalization data on sales by other than convenience goods or shopping good outlets is almost entirely aggregated, except for a few categories, into the "all other outlets" category. For these reasons sales of other goods are aggregated into one group for the purpose of tax incidence analysis. As for the previous two groups, substantial shifting forward of the tax burden is assumed. The shift is greater than for shopping goods but less than for convenience goods.

The demand for convenience goods is locationally sensitive and consequently unaffected by border location. Thus, the loss of convenience sales due to minor differences in tax rate is assumed to be zero.

Those retail outlets engaged in the sale of shopping goods and "other" retail outlets, which are also in border locations may have decreased ability to pass on to consuming households the burden of taxation. For these outlets reduced forward shifting may be possible (see Table III-3). The Land Use Project will provide answers as to whether or not retail sales patterns have actually shifted away from the higher taxed BART District. Until these results are available, however, it will be assumed that border location has no effect on the tax burden shifting characteristics of retail businesses with these locations.

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[1] Ibid.

TABLE III-3

ASSUMPTIONS ON FINAL INCIDENCE OF TAX BURDEN FOR SALES AND USE TAX[1]

PURCHASING SECTOR	PURCHASE TYPE	FINAL INCIDENCE SECTOR	PERCENT OF TAX ALLOCATED TO FINAL INCIDENCE SECTOR
Export Base Industry	----	Export Base Industry	100%
Population Serving Industry	----	Population Serving Industry	10
		Households	90
State and Local Government	----	Households	52
		Intermediate Sector	48
Households:			
(1) Non-Border Sales	Convenience	Households	100
	Shopping	Households	80
		Population Serving Industry	20
	"Other"	Households	90
		Population Serving Industry	10
(2) Border Sales	Convenience	Households	100
	Shopping	Households	70
		Population Serving Industry	30
	"Other"	Households	80
		Population Serving Industry	20
Non-BART District Residents	----	Non-BART District Residents	100

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[1] The tax incidence model developed for this project will permit any assumptions to be run.

Source: McDonald & Grefe, Inc., 1976

IV. INCIDENCE OF FARES AND BRIDGE TOLLS

Bridge tolls are a revenue source for BART which are used to pay off bonds on the transbay BART tube. All bridge toll collections, with the exception of bridge tolls collected by the Golden Gate Bridge, Highway and Transportation District, are administered by the California Toll Bridge Authority.[1]

All toll revenues for the Bay Area Rapid Transit District came from the California Bridge Toll Authority Fund. It may be assumed for purposes of analysis that the revenues from this common fund that were used in support of BART originated from tolls on the San Francisco Bay Bridge.[2] The following analysis of the incidence of bridge tolls will examine only the incidence of toll burden for users of this bridge.

The incidence of direct fares to BART and other public transpotation users is also evaluated.

A. Incidence Sectors for the Analysis of Tolls and Fares

Incidence sectors relevant to the analysis of bridge toll burden are resident households, business, and non-residents of the BART area. Previous sections of this analysis (property tax and sales tax) further divided business sector burdens between the basic and population serving subsectors for the purpose of tax burden shifting analysis. Unlike the analysis of Highway User Charges this extended division is not possible and simplified incidence shifting assumptions will be used.

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[1] The Golden Gate Bridge, Highway and Transportation District is a separate entity and its revenues are not used outside its own jurisdiction.

[2] After the initial bond which financed the San Francisco-Oakland Bay Bridge was retired, tolls continued to be collected. These funds were pledged to support bonds for additional crossing of the Bay, not excluding a transit crossing. See McDonald & Smart, Inc., Bay Area Rapid Transit: A Decision History, prepared for the Metropolitan Transportation Commission, September 1975, p. 48.

B. Initial Incidence of Bridge Tolls

The total Bay Bridge toll collection, by fiscal year, is available from the California Department of Transportation.[1] The initial burden of these tolls may be allocated to incidence sectors through the following methodology.

The Metropolitan Transportation Commission (MTC) is presently developing a model capable of producing information on the number of trips, their origin and destination for users of the San Francisco-Oakland Bay Bridge. The model will allow identification of the place of residence or, for business related trips, the place of work. This information will be used to determine the portion of total San Francisco-Oakland Bay Bridge trips which are attributable to BART area business and households, and which are generated by households and businesses from the remainder of the Bay Area and beyond.

If it is assumed that the majority of trips on the bridge are roundtrips then it may be inferred that one toll is collected from each user for each two crossings. (Tolls are collected only for trips in the westerly direction). The relative distribution of users by place of origin may therefore be used to allocate the total toll collections to the geographic origin of the payers of those tolls.[1]

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[1] California Department of Transportation (CALTRANS), District 04, Toll Bridges Annual Report, Financial Supplement (Annual).

In addition to total toll collection data, the Department of Transportation provides a breakdown of collections by type of vehicle: automobiles, trucks and buses.[2] The division of toll burden between the household and business sectors may be inferred from these data. Assume that all automobiles are non-commercial and all trucks and buses are commercial. This simplification will induce some inaccuracy since not all autos are non-commercial nor all trucks and buses commercial. The relative division between commercial and non-commercial toll burden may be applied equally to each of the toll collection figures allocated to the three BART counties.

This division between commercial and non-commercial incidence by county, although simplistic, is the best information available since the MTC Travel Model System does not provide information on the type of vehicle making a particular trip. Toll collections, however, are a function of type of vehicle.

C. Final Incidence of Bridge Tolls

Some forward shifting of bridge toll burden from the business sector to the household sector may be expected. The magnitude of the shifted burden for bridge tolls is dependent on the same influences as that of other highway user charges (see Table IV-1), assuming also that 50% of the toll burden experienced by the business sector is shifted forward to households.

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[1] Until these parameters are available no breakdown of fare revenues by place of payor origin will be made.

[2] CALTRANS, op. cit., pp. 52-53.

D. Initial and Final Incidence of BART Rider Fares

The BART system is designed and used for transportation around the Bay Area. It is not designed to transport cargo, nor most forms of commercial property. Consequently, an overwhelming portion of its fare collection may be considered attributable to the household sector (journey-to-work is considered a household rather than a business expense). Very little of BART's patronage reflects a business use.

In order to compute the fare incidence for each economic sector, total fare collections are first determined. These data are readily available from BART's annual reports.

The MTC Travel Model System allows the allocation of fare collections to place of origin.[1] This directly shows the relative distribution of fare collections attributable to each of the BART counties, as well as non-BART District contributions to total collections. The Metropolitan Transportation Commission has also developed a passenger profile through an on-board survey of BART riders. From these data the portion of person trips for business purposes were derived. This fraction, when applied to total revenue collections, approximates the initial incidence of direct fares for the business sector. The remaining portion of fares are paid by the household sector.

Fares attributable to the business sector are partially shifted forward to households. Factors determining the magnitude of the forward shift are the same for fares as for highway user charges. Therefore, it is assumed that 50% of the fare burden borne by the business sector is shifted forward to the household sector.

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[1] Until travel model data are available, the allocation of fare revenues by county must be assumed. Fare revenues could be allocated to counties on the basis of the relative distribution of fare collection associated with the journey-from-work in a typical month. The necessary data for this distribution is available from MTC.

E. Initial and Final Incidence of Bus and Non-BART Fixed Rail Public Transit Fares

Bus service throughout the three county BART district, in addition to non-BART fixed rail transit in San Francisco, serves a great number of public transportation users. A sizable portion of funding used to support these non-BART modes of transit comes from fare box revenues.[1] Total fare revenue data for non-BART transit in the three county area are available for the several relevant transportation districts or agencies. These include the San Francisco Municipal Railway (SF MUNI), Alameda-Contra Costa Transit District (AC Transit), and the Golden Gate Bridge, Highway and Transportation District (GGBHTD).

Fares generated by the GGBHTD were excluded from the incidence analysis since these fares did not represent an economic impact (i.e., there is probably no difference in fare collections with or without BART).

F. Projection of San Francisco-Oakland Bay Bridge Tolls and SF MUNI and AC Transit Fares

Forecasts of revenue sources made by AC Transit and SF MUNI indicate that total fare revenues will either remain constant or increase at a rate less than that of inflation.[1] AC Transit management is forecasting increases in total fare revenues of 2% a year. SF MUNI management believes fare revenues will remain constant in the short run.[2] Traffic projections for the Bay Bridge indicate an increase of 0.9% a year.[3] If fares remain constant, bridge toll collections will increase about 1% a year. For purposes of analysis, fares for both agencies as well as the Bay Bridge can be assumed to increase at a compound rate of 1% a year.[4]

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[1] In the 1975-76 fiscal year, approximately 30.6% and 32.5% of total revenues for AC Transit and SF MUNI, respectively, were fares. Source: Legislative Analyst, State of California, Financing Public Transportation in the San Francisco Bay Area (Three County BART District, November 1975, pp. 54-55.

These growth rates may be modified upon completion of the MTC Transportation Model System which will include analysis of the change in number of passengers and the fares paid by those passengers for the BART and NBA scenarios.

The MTC Transportation Model System provides information on fare collections attributable to AC Transit and SF MUNI riders by place of residency. As with the BART system, this MTC data will directly show the bus fare burden borne by residents of each county.

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[1] Legislative Analyst, November, 1975, p. 51.

[2] *Ibid.*, p. 53.

[3] *Ibid.*, p. 122.

[4] Projections of deficits are forthcoming but dependent upon the evaluation of expenditures by agency by the Metropolitan Transportation Commission.

Final incidence of bus fares is assumed to have the same characteristics as those of BART fares and highway user charges. Table IV-1 reiterates the assumptions on shifting of fare burdens.

TABLE IV-1

ASSUMPTIONS ON SHIFTING OF FARE BURDEN, BRIDGE TOLLS, BART FARES, BUS FARES

Purchasing Sector (Users)	Final Incidence Sector	Percent of Burden
Business	Business	50 %
	Households	50
Households	Households	100

Source: McDonald & Grefe, Inc.

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[1] For an evaluation of future BART deficit see Metropolitan Transportation Commission, "Implications of Alternative Financing for BART," August, 1976.

V. INCIDENCE OF HIGHWAY USER TAXES

There are a number of revenues paid by users of the highway system. These include the excise and use taxes on motor vehicle fuels, the highway driver's license fees, vehicle registration fees, and vehicle weight fees. While these five constitute the major sources, there are also a number of other licensing fees and extraneous charges which are collected by the California Department of Motor Vehicles.

The magnitude of the revenues generated by most of these transportation related taxes is not affected by the presence of BART. These taxes are therefore not germane to the analysis of BART impacts. In addition, some of these taxes cannot be related directly to the support of Bay Area transportation.

Driver's license, vehicle registration and vehicle weight fees are assumed unaffected by the presence of BART.[1] In addition, the use of these revenues is not necessarily directly related to transportation.[2] Motor vehicle fuel taxation is of interest because these funds are used to support transportation-related activities.

Bridge tolls are highway use fees, but they were treated separately in Section IV because of their explicit role in financing the trans-Bay tube.

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[1] In fact, BART has little impact on the volume or behavior of automobile traffic. See Metropolitan Transportation Commission, "Impact of BART on Transportation and Travel: Interim Service Findings, Interpretive Summary, July 1976, p. 10.

[2] Vehicle registration fees include an ad valorum tax levied at the State level. The in lieu tax is distributed to city and county governments and is not restricted to use in transportation. Large portions of licensing fees and weight fees are allocated to use in law enforcement.

A. Incidence Sectors for the Analysis of Highway User Taxes

The incidence sectors that will be used in the analysis of the burden of highway user taxes are households and businesses. The division of motor vehicle fuel excise tax between the household and business sectors may be done with some degree of accuracy. There is no data base, however, for the further division of commercial motor vehicle fuel use between the basic and population serving sectors. Although this division is helpful in portraying the shifting of tax burden, in this analysis one assumption is formulated for incidence estimations of the entire business sector.

Some portion of the burden of the fuel excise tax must be exported from the BART tax area through non-resident purchases of fuel (e.g., gasoline purchases by a truck driver just passing through the area). In the same manner, tax burden may be imported when a BART area resident pays the fuel excise tax in a non-BART area county. It is assumed that the net export of tax burden is zero.

B. The Motor Vehicle Fuel Tax Base

Before the division of the tax burden among economic sectors can be computed, a knowledge of total tax collections in the BART area is required. Tax collection data on motor fuel sales are not recorded for particular counties, but only for the state as a whole. The number of gallons sold at the county level may be found by the following method.

The California State Board of Equalization maintains a record of gross sales in service stations in their quarterly and annual reports of sales and use tax. Statewide totals for taxable fuel sales in gallons are available from the same source.[1] The amount of gasoline sold in each county is assumed to be proportional to retail sales in service stations.[2]

1. Projection of Motor Vehicle Fuel Consumption and Excise Tax Revenue

The California Department of Transportation has made several projections of motor vehicle fuel consumption for the year 1995.[3] The various projection scenarios include two alternate versions for the magnitude of the future road network in California, called "build" and "no build." The no build scenario assumes that future interstate systems will not be significantly expanded. In addition, for each of the road system scenarios, two variations of vehicle mix by mode of power (the relative devision of vehicles between eight, six and four cylinder engines) are incorporated into the projections. This provides a total of four alternate projections of future motor vehicle fuel consumption.

One of these four projections was selected for this tax incidence model. The computation of future excise tax revenue was based upon the CALTRANS projection which assumes a limited growth of the interstate highway system, no build, and a future mix of automobiles which has a greater proportion of smaller engine autos than the present mix. The CALTRANS projection is only for the year 1995. The necessary fuel consumption data for future years relevant to the tax incidence analysis were interpolated and extrapolated on a straight line basis, based upon fuel consumption in 1973 and the project 1995 point.

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[1] California State Board of Equalization, Annual Report.

[2] McDonald & Grefe, Inc., "Economic Practices Manual," prepared for State of California Office of Planning and Research, December 1975, p. 10-57.

[3] California Department of Transportation (CALTRANS), "Highway Fuel Use," Internal Memo, June 1975.

Table V-1 contains these projections as well as historical data.

C. Incidence of the Excise Tax on Fuels

The excise tax on gasoline, diesel fuel and other liquified petroleum sales is levied upon the manufacturers and importers of the fuels at a rate of $0.11 per gallon. Although the tax is levied upon the sellers, the final consumer is charged the tax by the distributor at the time of purchase. $0.04 of the excise tax is directed to the Federal Highway Fund. The remaining $0.07 is used by the State and apportioned between cities, counties, and the State Highway Fund.[1] Only the $0.07 increment is germane to the present analysis.

Since the final consumer is charged the full amount of the excise tax at the time of purchase, the initial incidence of the tax is with the buyer of motor vehicle fuel. The division of initial tax burden between households and business was estimated as follows: the miles per gallon and total motor vehicle fuel consumption, for both heavy duty and light duty vehicles, are available from the

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[1] McDonald & Grefe, Inc., "Economic Practices Manual," prepared for State of California Office of Planning and Research, December 1975, p. 19-52.

TABLE V-1

MOTOR VEHICLE FUEL CONSUMPTION AND FUEL TAX REVENUES
BART COUNTIES

uel Consumption[1] (Thousands of Gallons)

Year	Alameda Co.	Contra Costa Co.	San Francisco Co.
1971-72	285470	525100	159406
72-73	403910	450979	210165
73-74	422403	428869	212278
74-75	407889	441607	202312
75-76		(see footnote 3)	
1980-81	422671	372945	195661
1990-91	421107	371565	194937
2000-01	420325	370875	194575

et Tax Revenue[2] (Thousands of dollars, projections[4] are in 1975 dollars)

Year	Alameda Co.	Contra Costa Co.	San Francisco Co.
1971-72	$19585	$36025	$10936
72-73	27672	30897	14398
73-74	28926	29369	14537
74-75	28008	30323	13892
75-76		(see footnote 3)	
1980-81	28965	25557	13408
1990-91	28846	25452	13353
2000-01	28792	25405	13328

Source: California Department of Transportation

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[1] Includes gasoline, diesel fuel and L.P.G. Excludes jet fuel.

[2] Includes self-assessed taxes, tax deficiencies, interest and penalties, tax paid at reduced rate by transit districts, net of refunds for non-highway use.

[3] Information not yet available from California State Board of Equalization.

[4] Projections of revenues are based upon the continuation of the same effective rate of fuel taxation that existed in the fiscal years 1971-72 through 1974-75. Revenues projected at state level are allocated to counties on the basis of the distribution of service station sales in the 1975 fiscal year.

California Department of Transportation[1] at a statewide level of aggregation for the year 1973. The number of heavy and light duty vehicles may be divided between commercial and non-commercial uses on the basis of data published by the California Department of Motor Vehicles.[2] Thus, an estimate of yearly fuel consumption for commercial and non-commercial vehicles in the BART counties can be derived. It is assumed that all diesel fuel is consumed by the business sector.

Several factors influence the final incidence of excise tax burden for household purchases of motor vehicle fuel. A primary determinant is demand elasticity. The demand for motor vehicle fuel is almost entirely inelastic.[3] This would imply an almost complete forward shifting of the tax burden. Motor vehicle fuel, however, is a fungible good. Small differentials in price between competing service stations may produce large differences in quantity sold. Nevertheless, the market for fuel at the retail level is highly oligopolistic (as is most retailing).[4] The firms of an oligopolistic industry often increase prices simultaneously in order to avoid any individual loss of market share. This enables an almost complete forward shifting of tax burden as any particular consumer must either pay the higher price (lacking alternative supplier) and/or reduce consumption.

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[1] California Department of Transportation (Caltrans), "Highway Fuel Use," Internal Memo, (June, 1975).

[2] California Department of Motor Vehicles, Statistical Record of Motive Power Body Type and Weight Divisions for Automobilies, Motorcycles, Commercial Trucks and Trailers - Jan. 1 to Dec. 31 1973 - Gross Report (undated).

[3] Gasoline demand elasticity has been estimated to be about -0.15 in the short run. See: State of California Legislative Analyst, Financing Public Transportation in the San Francisco Bay Area, (November, 1975), p. 107.

[4] John F. Due, Theory of the Incidence of Sales Taxation, (1942), p. 119.

The ability of the business sector, both population serving and basic industry subsectors, to shift their portion of the tax burden forward to consumers is determined by the same influences relevant to other taxes. The two subsectors, however, are not differentiated in this analysis, as they were for the property and sales taxes.

Basic industries in general are unable to pass forward the burden of taxation because of their participation in the interregional market. If excess profits exist in a particular export base industry, then the industry will be able to absorb the added cost of fuel taxation without a general change in the market equilibrium (i.e., a change in output and/or price). If excess profits do not exist, and the burden of taxation is not passed forward to consumers, then the added cost of taxation must be absorbed, probably through a reduction in output (for a declining cost industry).

Population serving industries, on the other hand, are able to pass forward almost the entire burden of taxation in most cases. This is due to the oligopolistic nature of many population serving industries, and the inelastic demand for many consumer items. Assume for purposes of analysis of fuel taxation that population serving industries are able to raise prices by an amount which entirely compensates for the added cost of fuel taxation without a loss in quantity of output demanded. Then, these industries are able to pass forward the entire burden of taxation.

Since no information is available on the division of fuel consumption between the basic and population serving subsectors, an unweighted average of the shifting of fuel tax burden for the two subsectors will be used for the assumption of tax burden shifting applicable to the business sector as a whole. Thus, it is assumed that 50% of the tax burden on fuel is shifted forward to consumers. The remaining 50% is absorbed by the business sector.

It should be noted that the financing of the general transportation system which includes BART did not entail an increase in fuel taxation. The economic adjustments take place upon imposition of a tax and the final distribution of tax burden is a result of these adjustments. The financing of the general transportation plan which includes BART did not induce a reduction in output in the basic industry sector, nor has there been any substantial change in the revenues generated by the tax as compared to those that would have been raised under an alternative transportation system without BART.[1] In fact, BART has had little effect on the volume or behavior of automobile traffic.[2] Since there is virtually no difference between the distribution of fuel tax burden or the magnitude of this burden for BART and the NBA the effects of fuel taxation do not represent an economic impact of BART. These taxes are only of interest because they contribute to the support of Bay Area transportation systems.

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[1] Metropolitan Transportation Commission estimates that approximately 25,000 gallons of gasoline are used daily because of BART. This represents about 0.9% of the daily fuel consumption in the BART District. Source: Metropolitan Transportation Commission, "The Burdens and Benefits of BART: A Preliminary Case Study of Rapid Transit Impacts, May 1976, p. 19.

[2] Metropolitan Transportation Commission, "Impact of BART on Transportation and Travel: Interim Service Findings," July 1976, p. 10.

VI. INCIDENCE OF COSTS FOR GENERAL REVENUE FUNDS

General revenue funds are local funds (e.g., city or county) frequently used to make specific capital improvements around and near BART stations. For example, a street improvement and installation of traffic controls at an intersection near a BART station made necessary by the presence of BART, would be considered a general revenue cost impact.

The magnitude of these expenditures in each county are noted without tracing the cost incidence of the funds back to their sources. The magnitude of these expenditures does not warrant a study of general revenue fund sources for each locality. In addition, no projection of general revenue expenditures will be made, since such costs represent, except for maintenance, a one-time expenditure.

APPENDIX B

TYPICAL HOUSEHOLD GROUPS

APPENDIX B
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APPENDIX B

TYPICAL HOUSEHOLD GROUPS

One objective of this technical approach is to measure the burden of BART's financing in a way which is easily comprehensible and meaningful to decisionmakers faced with transit financing decisions. To provide this measure to BART's impact, and evaluate both the level and equity of BART's financing burden on the residents of the region, the incidence of BART and NBA taxes are classified over a range of typical household types. Accordingly, a representative range of household circumstances are presented.[1] Income levels from poverty to affluent and a variety of household sizes and age groups are included.

Eleven households have been defined, including:

- Group 1: Individual, lower living standard, over 65, retired.
- Group 2: Individual, low-moderate living standard.
- Group 3: Couple, low-moderate living standard.
- Group 4: Couple, low-moderate living standard, head over 65, retired.
- Group 5: Couple, moderate living standard.
- Group 6: Family of 3, low-moderate living standard.
- Group 7: Family of 3, moderate living standard.
- Group 8: Family of 4, poverty-level living standard, female head of household.
- Group 9: Family of 4, high living standard.
- Group 10: Family of 4, affluent living standard.
- Group 11: Family of 6, moderate living standard.

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[1] For a further description of the methodology used in defining these prototypical households, see McDonald & Grefe, Inc., "Definition of Typical Household Groups for Task 5, Tax Burden Analysis," a working note prepared for the Metropolitan Transportation Commission, revised July 1976.

I. ANALYTICAL FRAMEWORK

The socioeconomic characteristics essential to household tax burden analysis include:

- Income before taxes;
- Marital status;
- Senior citizen/retired status;
- Number of children in household under age 18;
- Market value of home or annual gross rent; and
- Annual amount of purchases subject to sales tax.

Once these six characteristics are described, it is possible to evaluate the expenditure patterns of each household which will be taxed by BART's property or sales tax and to compare those tax costs with the household income. The regressivity or progressivity of a tax is measured as the relative reduction in real income (i.e., "final incidence") per dollar of income over the range of taxpayers' incomes.

The relevant taxes to finance BART and NBA are property and sales taxes. The property tax amount paid by the homeowner and by the renter is estimated on the basis of an assumed market value of the home or capitalized value of the annual gross rent for each household group.[1] Accordingly, in our definition of household characteristics, average market value of owner-occupied homes and/or annual gross rent amounts are specified for each household group.

Sales taxes paid by a household are determined by the estimated amount of their taxable purchases, with the sales tax applied to these purchases. For each of the typical household groups, annual taxable purchases have been identified. Normally, a household's income level is the prime determinant of its retail spending.

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[1] Average property taxes paid per level of income data are not directly available, except for senior citizens who claim California's senior citizen property tax assistance. For all other household groups, it is necessary to estimate tax on the basis of property valuation exemptions and tax rates.

Other factors, such as family size and age of household members, may also influence consumption patterns. Thus, family size, number of children under 18, and other household age characteristics, including senior citizen or retired status, have been included in household characteristics in order to arrive at the most reliable estimate of taxable purchases.

The household data compiled here are based on the Department of Labor, Bureau of Labor Statistics (BLS) 1972-1973 Consumer Expenditure Survey Series, the 1970 Census of Housing and annual personal income statistics from the California Franchise Tax Board. Figures for property tax have been adjusted to 1975-1976 levels, using the San Francisco-Oakland Consumer Price Index (CPI). Income figures for 1975-1976 were obtained by assuming an average growth in per capita income of 5.71 percent per year. Household consumption figures have been computed by adjusting 1972 values to 1975-1976 levels, using the San Francisco-Oakland Consumer Price Index and then applying the 9.9 percent decline in real income.

II. SELECTION AND DEFINITION OF TYPICAL HOUSEHOLDS

The selection of "typical" households was based on a distribution of household size by income for the San Francisco-Oakland Standard Metropolitan Statistical Area (SMSA), as shown in Table II-1. Households believed to be representative of discrete socioeconomic groups were selected. The number of households in the SMSA with characteristics corresponding to this study's definition of "typical" are circled in Table II-1.

Table II-1

DISTRIBUTION OF HOUSEHOLDS IN THE SMSA
BY INCOME AND PERSONS PER UNIT

	PERSONS PER UNIT						
Income ($000s)	1	2	3/4	5	6+	Roomers Boarders Lodgers	TOTAL
Total	262,429	330,640	325,050	88,087	79,306	33,788	1,119,300
2	60,645	23,233	14,867	2,870	2,402	6,428	110,445
2-5	74,937	51,342	25,710	5,143	5,408	7,561	170,101
5-10	85,726	96,265[1]	77,378	17,216	17,131	10,847	304,563
10-15	28,617	80,297	99,017	28,945	24,850	5,370	267,096
15-25	9,352	60,291	82,883	25,365	21,941	2,686	202,514
25+	3,152	19,212	25,195	8,548	7,574	900	64,581

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[1] This element accounts for two typical household groups.

Source: 1970 Census of Housing.

Typical household characteristics for 1975 are shown in Table II-2. The incomes of these typical households were defined as

Table II-2

TYPICAL HOUSEHOLD CHARACTERISTICS FOR 1975

Group No.	Household Description	Income (1975 $)	Household Size	No. of Children	Market Value of Housing (1975 $)
1	Individual, lower living standard, over 65 retired	$ 4,489	1	0	$21,417
2	Individual, low-moderate living standard	$10,041	1	0	$15,186
3	Couple, low-moderate living standard	$10,277	2	0	$32,450
4	Couple, low-moderate living standard, head over 65	$ 6,851	2	0	$22,975
5	Couple, moderate living standard	$15,711	2	0	$33,618
6	Family of 3, low-moderate living standard	$ 8,859	3	1	$32,450
7	Family of 3, moderate living standard	$14,411	3	1	$32,450
8	Family of 4, poverty-level living standard, female head of household	$ 2,362	4	3	$10,384
9	Family of 4, high living standard	$21,735	4	2	$38,940
10	Family of 4, affluent living standard	$45,715	4	2	$68,275
11	Family of 6, moderate living standard	$18,191	6	4	$37,642

Source: McDonald & Grefe, Inc.

described below, and then adjusted to 1975 levels, using a growth of 5.71 percent per year.[1]

- Group 1 represents the average household income of elderly (over 62) persons residing alone, claiming California senior citizen property tax assistance.[2]
- Groups 2 and 3 were derived from the 1970 Census of Metropolitan Housing and represent, respectively, the weighted average of the incomes of one- and two-person households in the $5,000 to $9,999 income bracket.
- Group 4 represents the average household income of couples claiming California senior citizen property tax assistance as described in the California Franchise Tax Board Annual Report, Calendar Year 1973, Table D-4.
- Group 5 represents the median income of all two-person households shown in the 1970 Census.
- Groups 6, 7, 9, 10 and 11 were defined using the BLS 1972-1973 Consumer Expenditure Survey Series. Group 6 income is the weighted average of average income levels for the income classification between $5,000 and $9,999. Group 7 is the weighted average of income levels from $10,000 to $14,999. Group 9 is the weighted average of income levels from $15,000 to $24,999. Group 10, at $38,700, is the average income for families in the $25,000 and over bracket.
- The Group 8 (poverty) $2,000 annual income was derived from the 1970 Census of Population, General Social and Economic Characteristics. Median poverty-level incomes in 1970 were $1,808, with mean family size at 3.7 persons in Alameda County, $1,774 with 3.69 persons per family in Contra Costa County and $1,660 with 3.6 persons per family in San Francisco County.
- Group 11 was derived from the BLS "Autumn 1972 Urban Family Budgets and Comparative Indexes for Selected Urban Areas", which estimates the total budget in the San Francisco-Oakland area at $12,324 for a four-person family at an intermediate standard of living. The BLS revised equivalency scale was applied to generate the

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[1] Based on growth in total personal income in the BART counties, as described in State of California, California Statistical Abstract, Table D-5.

[2] Franchise Tax Board and Census data.

> budget of a six-person family (husband, wife, four children, oldest under age 6). The total budget level was taken at 80.8 percent of income before taxes, the percentage of total budget to income for the urban family in the BLS 1960-1961 Survey of Consumer Expenditures.[1]

Marital status, family size and number of children under age 18 are important in varying degrees in determining housing and other consumption expenditures. Table II-3 shows the distribution by household size for the typical households, as compared with the actual distribution of households in the SMSA. Groups 1 and 2, the one-persons households, are de facto defined in terms of these characteristics. Groups 3, 4 and 5, couples, were checked against census data to make sure that their designations as husband and wife pairs with no children living at home were appropriate. The marital status, family size and number of children of groups 6, 7, 9 and 10 were drawn directly from the BLS 1972 Consumer Expenditure Survey Series data for typical households. Group 8 family size is taken from the U. S. 1970 Census of Population, General Social and Economic Characteristics, which indicates that the median family size of poverty-level families in the three BART counties is approximately four persons.

Table II-3

DISTRIBUTION BY HOUSEHOLD SIZE

	PERSONS PER UNIT						
	1	2	3/4	5	6+	Roomers Boarders Lodgers	Total
Actual	23%	30%	29%	8%	7%	3%	100%
11 Typical Households	24%	27%	45%	0%	4%	0%	100%

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[1] U. S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditures and Income," BLS Report 237-92, May 1965, p. 2.

III. AVERAGE FAIR MARKET VALUE OF HOMES

Market values for the homes of each of the typical households were derived from California Franchise Tax Board data and adjusted to 1975-1976 levels. Table III-1 shows the typical households, their incomes and the market value of their housing in 1972 and in 1975. These figures were obtained as follows:

- Group 1 home values are derived indirectly from California Franchise Tax Board data. For $3,800 annual income, we estimate property taxes averaged $400.[1] Assuming an average tax rate of $11.84/$100 assessed valuation and homeowner's exemption of $750,[2] the implied market value is:

$$\frac{\$400}{.1184} = \$3,378 \text{ (taxable assessed value)}$$

$$\$3,378 + \$750 = \$4,128 \text{ (total assessed value)}$$

$$\frac{\$4,128}{0.25} = \$16,513 \text{ (fair market value)}$$

- The home value for Group 3 was also indirectly derived. Neither the FTB nor the Census publish house value data specifically for this category. FTB data showed a typical household with an income of $7,500 owning a home worth $25,000, whether the household consists of one head and one dependent, or a married couple with two children. The FTB reports a typical single individual in that bracket owning a house worth $22,000. The $25,000 figure was thus tentatively assigned to Group 3.

- The home value for Group 4 was derived in a manner paralleling that of Group 1. Estimating that for a $5,800 annual

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[1] State of California, Franchise Tax Board, Annual Report, Calendar Year 1973, Table 2, "Senior Citizen Assistance Statistics, Comparison by Size of Household Income, 1973 Calendar Year," p. 111.

[2] See Attachment 2 of Working Note: California Franchise Tax Board's "Special Report: Revised Income Tax, Source Data for Impact Tables," March 4, 1974.

Table III-1

TYPICAL HOUSEHOLD CHARACTERISTICS FOR INCOME AND HOUSING[1]

Group No.	Household Description	1972 Income	1975[2] Income	1972 Housing Value	1975 Housing Value
1	Individual, lower living standard, over 65 retired	$ 3,800	$ 4,489	$16,500	$21,417
2	Individual, low-moderate living standard	$ 8,500	$10,041	$11,700[3]	$15,186
3	Couple, low-moderate living standard	$ 8,700	$10,277	$25,000	$32,450
4	Couple, low-moderate living standard, head over 65	$ 5,800	$ 6,851	$17,700	$22,975
5	Couple, moderate living standard	$13,300	$15,711	$25,900	$33,618
6	Family of 3, low-moderate living standard	$ 7,500	$ 8,859	$25,000	$32,450
7	Family of 3, moderate living standard	$12,200	$14,411	$25,000	$32,450
8	Family of 4, poverty-level living standard, female head of household	$ 2,000	$ 2,362	$ 8,000[4]	$10,384
9	Family of 4, high living standard	$18,400	$21,735	$30,000	$38,940
10	Family of 4, affluent living standard	$38,700	$45,715	$52,600	$68,275
11	Family of 6, moderate living standard	$15,400	$18,191	$29,000	$37,642

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[1] Conversion of 1972 Typical Households to 1975/76 Typical Households.

[2] Computed using 5.71 percent per year growth rate.

[3] Computed at 6 average annual rent.

[4] Assumed.

Source: McDonald & Grefe, Inc.

income, property tax averaged $435,[1] and assuming an average tax rate of $11.84/$100 assessed valuation and homeowner's exemption of $750,[2] the implied market value is $17,695. This figure is tentative, pending further investigation of the 1972 Senior Citizen Property Tax Assistance Program and the 1972 property tax rates in the three BART counties.

- The data for Group 5 were derived by comparison with other households in the same income bracket, in the same way as Group 3.
- For Groups 6, 7, 9, 10 and 11, home values are taken directly or adapted from the California Franchise Tax Board's "Special Report: Personal Income Tax, Source Data for Impact Tables," March 4, 1974.

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[1] State of California, Franchise Tax Board, *Annual Report, Calendar Year 1973*, Table 2, "Senior Citizen Assistance Statistics, Comparison by Size of Household Income, 1973 Calendar Year," p. 111.

[2] See Attachment 2 of Working Note: California Franchise Tax Board's "Special Report: Revised Income Tax, Source Data for Impact Tables," March 4, 1974.

IV. HOUSEHOLD CONSUMPTION

Annual taxable purchases were estimated for each of the typical households, as shown in Table IV-1. Taxable purchases were based on Franchise Tax Board figures and adjusted to 1975 levels, using the Consumer Price Index for San Francisco-Oakland. For Group 1, taxable purchases of $2,116 were interpolated from figures for typical single persons in the $2,500 and $5,100 adjusted growth income brackets. Similarly, taxable purchases of Group 2 represent the weighted average of Franchise Tax Board estimates for the appropriate income bracket. The taxable purchases of Groups 3, 4 and 5 were adjusted from the estimates for families of four in the appropriate Franchise Tax Board income brackets, using conversion tables published by the Internal Revenue Service. Taxable purchases of Groups 6 and 7 were taken from Franchise Tax Board estimates for families of four in the appropriate income groups, adjusted slightly downward to account for differences in family size. Group 8 taxable purchases were estimated at $1,000. The taxable purchases of the remaining typical household groups were taken directly from the Franchise Tax Board data.

Table IV-1

ANNUAL TAXABLE PURCHASE BY TYPICAL HOUSEHOLDS

Group No.	Household Description	Taxable Purchases
1	Individual, lower living standard, over 65, retired	$2,422
2	Individual, low-moderate living standard	$3,921
3	Couple, low-moderate living standard	$4,036
4	Couple, low-moderate living standard, head over 65	$3,460
5	Couple, moderate living standard	$5,190
6	Family of 3, low-moderate living standard	$4,267
7	Family of 3, moderate living standard	$5,305
8	Family of 4, poverty-level living standard, female head of household	$1,153
9	Family of 4, high living standard	$7,150
10	Family of 4, affluent living standard	$9,687
11	Family of 6, moderate living standard	$6,548

Source: McDonald & Grefe, Inc.

V. BART COSTS FOR TYPICAL HOUSEHOLDS

For analysis purposes, the household burden of BART costs was divided into two sectors, the tax burden induced by BART operating expenses and that induced by BART capital requirements. These figures were computed by applying property tax rates to the market value of housing for each household group, and the BART sales tax to the estimated taxable purchases for each household group. Tax burden was then defined in terms of the percent of household income required to pay BART costs.

Both the BART tax burden for operating expenses and the BART tax burden for capital requirements were estimated for 1975-1976. The total tax burden for typical households required by the total capital requirements generated by bond retirement was not considered in this analysis, since to do so would have required "aging" typical households through their natural life spans, which was beyond the scope of this analysis. Obviously, elderly retired individuals will not pay for BART for 33 years, and the married couple will probably "age" and become a family of three or more (or two households of one).

In estimating tax burdens, a property tax rate of 42.1 cents per hundred dollars of assessed value was used to generate the property tax burden for capital costs. A property tax rate of 5.0 cents per hundred dollars of assessed value was used in estimating the property tax burden for operating expenses. A separate analysis of property tax burden for households in each of the BART counties was not computed, since the differing property rates reflect equalization of varying assessment ratios among counties.

Sales tax burdens for operating and capital expenses were generated by applying a rate of 0.457 percent for operating expenses and a rate of 0.043 percent for capital expenses. These ratios reflect the ratio of sales tax revenues used for operating and capital expenses in fiscal year 1976.